A knowledge-based HIV/AIDS framework for Lagos State

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Abstract

Nigeria is suffering from the human immunodeficiency virus / acquired immune deficiency syndrome (HIV/AIDS) epidemic with over 80% of HIV/AIDS cases in Lagos State thought to have been contracted as a result of unsafe behaviour by young people, socio-economic factors and the inadequacy of the public health services (including a lack of information sharing and other organisational challenges). This thesis investigates non-clinical HIV/AIDS activities and explores the efficacy of contemporary E-Health initiatives, including systems focusing on healthcare information, telecommunications and information and communication technologies. The study investigates non-clinical HIV/AIDS activities by studying students from Lagos State.

Data was collected from selected secondary schools in all Lagos State administrative divisions, as well as Lagos State University. Schools were selected in each division (2-5 schools) using a stratified proportional random sampling principle. A questionnaire was developed based on HIV/AIDS transmission and prevention indicators. This was administered to 1000 students (senior secondary school 1-3 and Lagos State University students) through their guiding and counselling units. The pupils returned 958 (95.8%) questionnaires from 10 participating senior secondary schools and Lagos State University (Agege and Isolo campus). Semi-structured interviews were carried out with staff of the Lagos State AIDS Control Agency (LSACA) in order to collect qualitative data and establish the direction of the study.

The study triangulated qualitative and quantitative data in order to investigate the extent of HIV/AIDS awareness and education, especially regarding transmission and prevention risk factors. The returned questionnaires were analysed using descriptive and inferential statistics via SPSS®17. The empirical gaps were revealed to be: (a) behavioural challenges; (b) sexually transmitted infections - STIs and clinical understanding; (c) lack of transmission awareness; (d) condom use; (e) fear of HIV/AIDS-related stigma and discrimination (HASD) and (f) ineffectiveness of HIV Counselling and Testing centres in the Lagos State metropolis. Knowledge Management (KM) concepts were effectively adopted to propose a validated framework to tackle gaps related to transmission and prevention risk factors in Lagos State. This could raise HIV/AIDS awareness, aid knowledge transfer and unify biomedical activities with the aim of creating a centralised database as well as support E-Health activities and address issues of stigmatisation and discrimination. People living with HIV/AIDS (PLWHA) would be able to access quality healthcare and medical assistance regarding STIs and opportunistic infections and HIV/AIDS epidemiology monitoring and evaluation activities would be more efficient.

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Dedication

This thesis is dedicated to my Family, who have inspired and believed in me:

***His & (Oolori) Royal Majesty*, Oba Rauf Adeniyi Amore-Apena (Amore 1)** - *Parents*

(The Olu of Ikeja, Lagos State, Nigeria)

and

Princess Yetunde Fatima Amore-Apena - *Wife*

Princesses Temilade and Demilade Amore-Apena (twins) - *Children*

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List of Publications

1. Sassman R, Apena W, Bali RK, Naguib RNG, Marshall IM and Odetayo M (2011) "Issues in Evaluating Knowledge-Based HIV/AIDS Programmes: Perspectives From Nigeria", *Proc of the Developments in e-Systems Engineering conference*, December 2011, Dubai, UAE [CD-ROM]

2. Apena W, Bali RK, Binnersley J, Naguib RNG, Odetayo MO and Wickramasinghe N (In press), "The challenge of HIV/AIDS organisations in Nigeria: making sense through Knowledge Management", *International Journal of Healthcare Delivery Reform Initiatives*

3. Apena W, Bali RK, Binnersley J, Naguib RNG, Odetayo MO and Baskaran V, "Evaluation of HIV health services in Lagos State: an empirical study", (In press), *International Journal of Services, Economics and Management*

4. Apena W, Bali RK, Binnersley J, Naguib RNG, Odetayo MO and Baskaran V, (In press), "HIV/AIDS Behavioural Challenges in Lagos State Schools: An Empirical Study", *International Journal of Technology, Policy and Management*

1 Introduction

The chapter introduces the aims and objectives of the research project (detailed in Sections 1.1 and 1.2). Section 1.3 presents Nigeria's geo-political zones and the government response to Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS). Section 1.4 describes the Federal Ministry of Health's role to address the HIV/AIDS epidemic. Section 1.5 highlights challenges facing the Nigerian healthcare sector whilst Section 1.6 presents an overview of the chapters of this thesis. Section 1.7 concludes the chapter with a short summary.

1.1 Research aim

This chapter presents a brief introduction to the research undertaken. The chapter introduces the research focus and state of HIV/AIDS in the Nigerian domain. The purpose of this research is to examine the efficacy of introducing contemporary Knowledge Management (KM) concepts into (non-clinical) HIV/AIDS activities in Lagos State through the use of knowledge-based evaluation. The key aim of this is to enhance HIV/AIDS transmission and prevention awareness through the application of knowledge transfer technologies. The study set question to supports the research focus and achievements. My primary research question is:

Can E-Health enhance HIV/AIDS activities in Lagos State through the appropriate use of knowledge transfer technologies?

The research set out hypotheses to validate the technology-based initiative through the stakeholders' contributions as follows:

- that it is possible to develop a HIV/AIDS KM based framework,
- that the framework will address empirical gaps in research and be available to study other HIV/AIDS risk factors,
- that the framework will reduce knowledge isolation,
- that the framework will unify information sharing and knowledge transformation among stakeholders.

1.2 Research objectives

The objectives of this research entail the investigation of HIV/AIDS awareness in Lagos and establish the necessity for the introduction of a Knowledge Management (KM) initiative. The scope of investigation is shown below in Figure 1.1

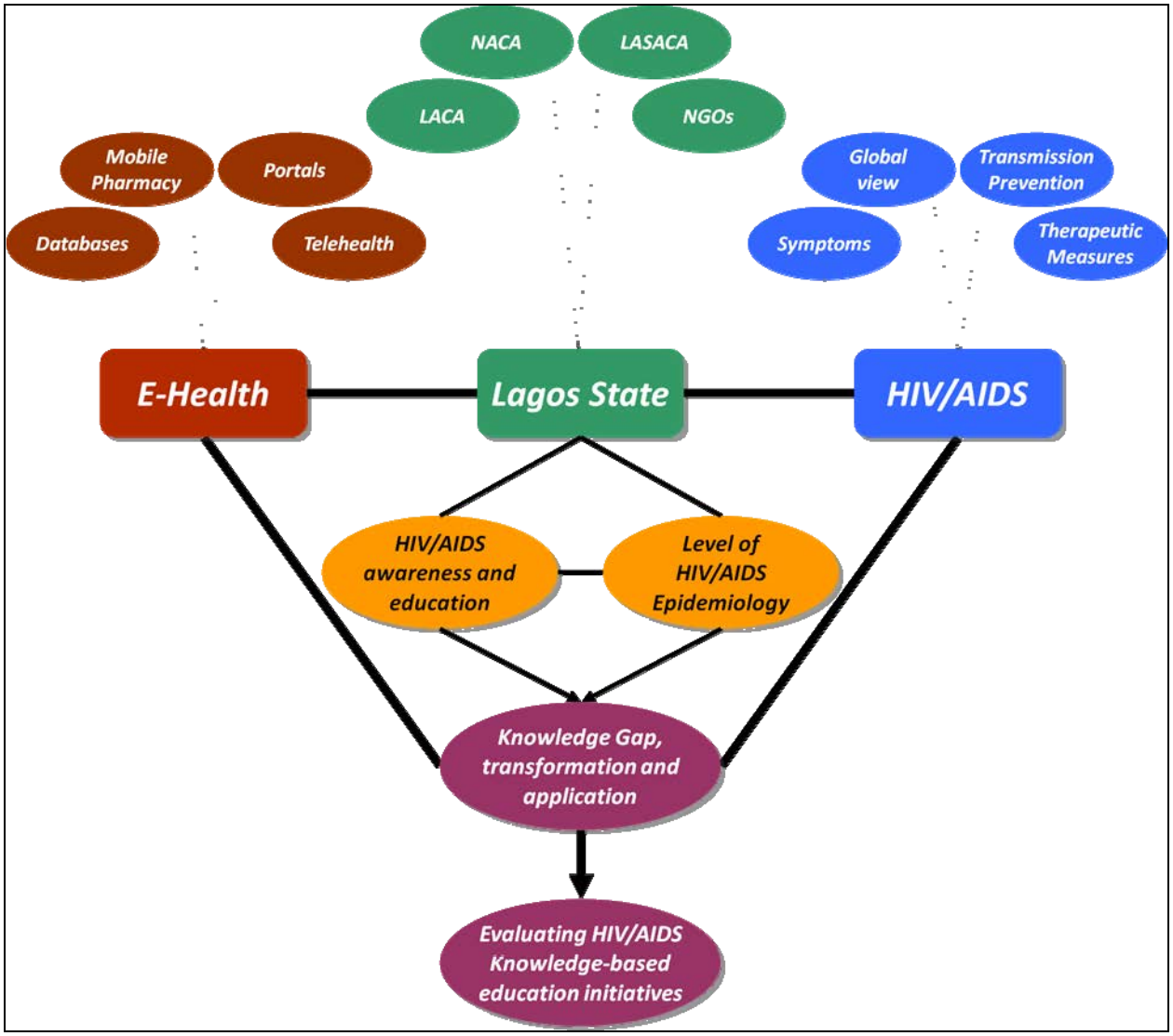


Figure 1.1 Scope of study

The research objectives are concentrated at the base of the inverted triangle (Figure 1.1) and leading to the aim of the study. The research objectives are as follows:

- review global initiatives on HIV/AIDS, initiatives in Lagos State (via the Lagos State AIDS Control Agency (LSACA) and e-Health
- evaluate student (non-clinical) HIV/AIDS awareness and education in Lagos State

- produce a validated framework on e-Health applications for HIV/AIDS activities in Lagos State Schools.

1.3 Overview of Nigeria

Nigeria is located on 9˚4'N latitude, 7˚.29'E longitude at world geographical coordinates in West Africa Sub Sahara and its capital city is Abuja. This is a country of about 350 ethnic languages and three main religions (Christianity, Islam and Traditional idols worshipper). Nigeria was a former British colony which gained independence on October 1st 1960; since independence, Nigeria has experienced political distortions by military juntas. The country has faced a series of challenges such as population growth, health, education, socioeconomic instability, political crises and civil war (Whitaker, 1981). Falola and Heaton (2009) stated that, "Nigeria is Africa's most populous country and the world's eighth largest oil producer, but its success has been undermined in recent decades by ethnic and religious conflicts, political instability, rampant official corruption and an ailing economy".

Such facts have altered the factors of demographic transition and decreased life expectancy from 51 years to 45 years. History has showed that Nigeria has faced different types of epidemics such as cholera, malaria, yellow fever, meningitis, chicken-pox, small-pox and typhoid. Supports from non-governmental organisations (NGOs) and international organisations such as United Nations have brought all these under control. However, for two decades now, HIV/AIDS has been

a long standing health problem in Nigeria (Kanki *et al*. 2004). Nigeria has thirty-six (36) states endowed with different types of natural resources, Figure 1.2.

The main language in the North is Hausa, in the East it is Igbo, in the West it is Yoruba and in the South there are Ijaw/itsekiri/irobo languages. The thirty-six states are divided into six geographical and political zones for the sharing of political power and resources. Table 1.1 shows how Nigeria is apportioned into zones.

Figure 1.2 Thirty-six state of Nigeria
< http://www.nigeriahc.org.uk/about-nigeria> [October 11, 2012]

North-East	Borno, Yobe, Bauchi, Gombe, Taraba and Adamawa
North-West	Sokoto, Kebbi, Zamfara, Kastina, Kano, Jigawa and Kaduna
North-Central	Platteau, Nassarawa, Niger, Kogi, Benue, Kwara and FTC
South-East	Anambra, Enugu, Ebonyi, Abia and Imo
South-West	***Lagos,*** Ogun, Osun, Ekiti, Ondo, Oyo
South-South	Edo, Delta, Bayelsa, Rivers, Akwa Ibom and Cross Rivers

Table 1.1 Nigerian six geographical zones

The population in these geographical zones varies with respect to land mass and socioeconomic activities in the zone.

1.3.1 Nigerian government response to HIV/AIDS

After the first case of HIV/AIDS was diagnosed in 1986 in Lagos, the Federal Government of Nigeria (FGN) officially met with the Federal Ministry of Health (FMOH) to set-up the National Expert Advisory Committee on AIDS (NEACA). The case was taken to the World Health Organisation (WHO) as it was considered to be an urgent situation. In 1987, the Federal Government created nine free testing and awareness centres in the geo-political zones of the country. As the program continued, all the nineteen states took action against HIV/AIDS and more cases were diagnosed.

The situation during 1986-1988 caused the International organisations to intervene, such as WHO and United Nations AIDS (UNAIDS) to team-up with the departments of government that were addressing the epidemic. In 1988 the NEACA was re-branded as the National AIDS Control Program (NACP) and worked with the FMOH, campaigning against Sexually Transmitted Infections (STIs). Later in the year, the name was again changed to the National AIDS and STDs Control Program (NASCP). In 1991, the government also encouraged the Nigerians to campaign for the prevention of mother-to-child transmission of HIV (PMTCT). In the last decade,

the government has given greater priority to health and launched more programs in Nigeria and other West African states. In 2001, the Nigerian government hosted the Organisation of African Unity (OAU) (now African Union) summit on HIV/AIDS and tuberculosis.

In preparation for the summit, the President (then Olusegun Aremu Obasanjo) created a presidential committee to focus on AIDS and a National Agency for the Control of AIDS (NACA) in 2000 and the NASCP was dissolved. The initiative was extended to other tiers of government such as the States AIDS Control Agency (SACAs) and local action committees on AIDS (LACAs). NACA remain the highest body responsible for issues on HIV/AIDS and the Federal Government also formed the HIV/AIDS Emergency Action Plan (HEAP). The duty of HEAP was to increase the capacity of NACA with regard to prevention awareness, care, and to support all the communities in the country. Despite these actions by the Nigerian government, various NGOs, international initiative and the FMOH, Nigeria still does not have HIV/AIDS under control (Kanki and Adeyi, 2006).

1.3.2 National agency for the control of AIDS (NACA)

The National Agency for the Control of AIDS (NACA) in Nigeria was created in 2000, along with the President's National Committee on AIDS (NCA). In the same year, the Federal Government set up a three-year HIV/AIDS Emergency Action Plan (HEAP) to produce long term plans for the NACA. The NACA has the mandate to co-ordinate policies and national projects related to HIV/AIDS issues at all levels (national, state and local government) in Nigeria (NACA, 2010).

NACA's mission and vision

- *"Be a responsive, caring, people-centred organization that is focused, creative, efficient and result oriented in work;*
- *Be an organization with a passion for transparent leadership in its response to the national call;*
- *Work together as a team, supporting outstanding people-oriented services that will greatly reduce HIV/AIDS in Nigeria ;*
- *Work in the public interest, acting in good faith, shunning all divisive pressures to provide care and support to people affected by HIV/AIDS".*

(NACA, 2010).

1.3.3 NACA's governance and structure

The NACA is constituted as a board in accordance with the constitution of the Federal Republic of Nigeria. The NACA has a 16-member board, headed by a Chairman and the administrative head, called the director-general. The NACA's Board is unilaterally structured; run and overseen by the Federal Government through the Federal Ministry of Health (NACA, 2010). The financial activities of the NACA come from the Federal Government of Nigeria and interest groups (United Nations, civil society, public sectors, international organizations and NGOs). The interest groups form partnerships with the NACA in order to give appropriate attention to the prevalence rate of HIV/AIDS in the country. Figure 1.3 below shows the structure of Federal Government activities through the NACA and other States agencies.

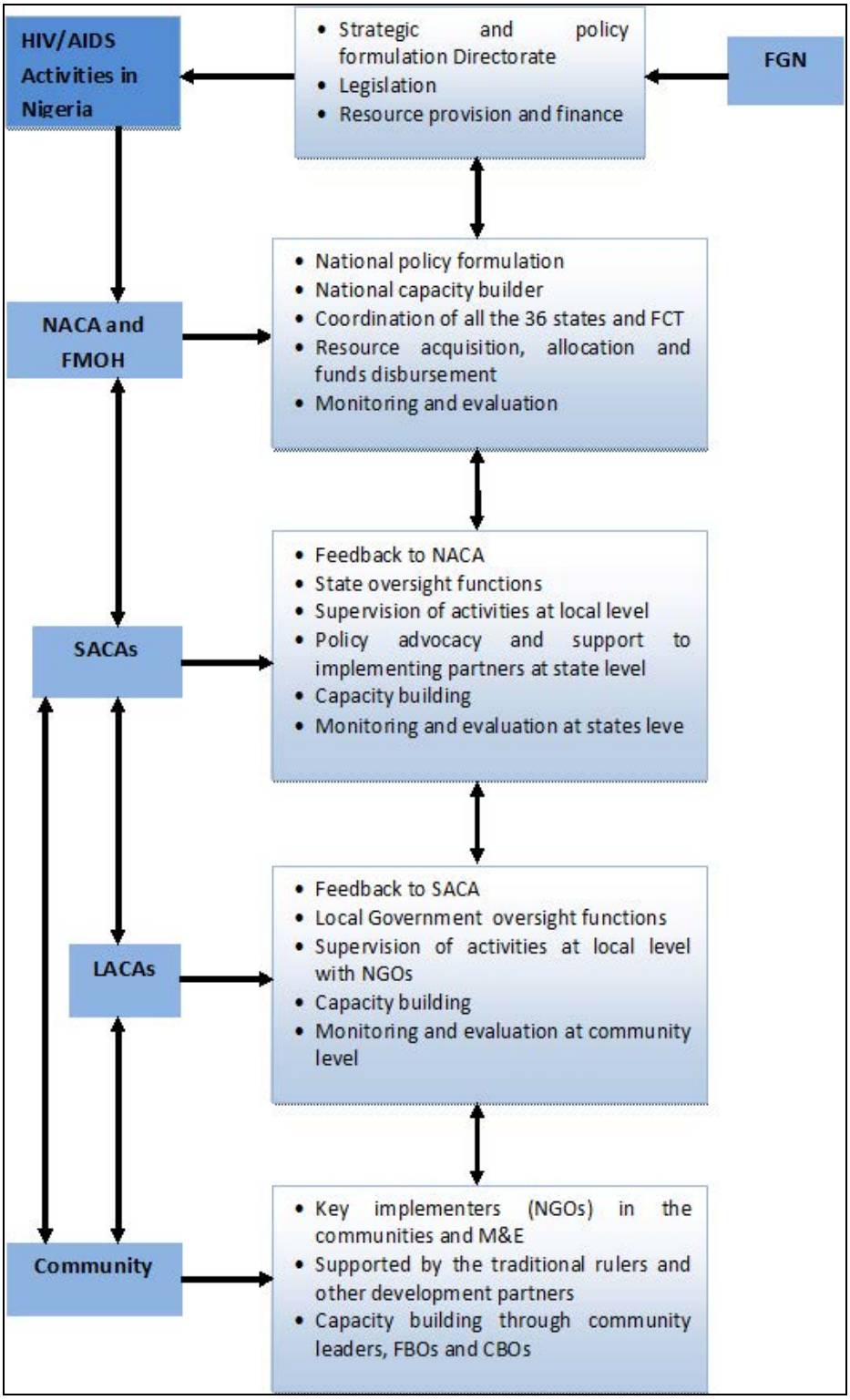


Figure 1.3 NACA and states agencies operation on HIV/AIDS

KEY

LSACA: Lagos State AIDS Control Agency
NACA: National Agency for the Control of AIDS

SACAs: States AIDS Control Agencies
LACAs: LACAs Local AIDS Control Agency
FBOs: Faith Based Organisations
CBOs: Community Based Organisations

1.3.4 Federal Ministry of health (FMOH) and HIV/AIDS

The Federal Ministry of Health (FMOH) is the highest health body in Nigeria and is headed by a minister from the healthcare sector. The Ministry comprises of many sub-bodies headed by an appointee (a politician or professional). There are also permanent secretaries and heads of departments (FMOH, 2010). All the health related activities of the Federal Government are channelled and executed through the ministry, inclusive of NGOs, local, national and foreign initiatives. The FMOH shouldered the burden of the public health, planning and intervention measures, projecting the need for the care and support of infected people. In order to monitor the rate of HIV infection in the country, the FMOH established the first national surveillance (sentinel survey) in 1991.

From 1991 to 2001, the FMOH conducted a survey of HIV/AIDS infection in pregnant women and the general population. These surveys show that HIV/AIDSs prevalence has consistently increased from 1.8% (1991) to 5.8% (2001). The sentinel survey was carried out in 2005 in all six geo-political zones (south-west, north-west, south-east, south-south, north-east, north- central) to analyse the state of HIV/AIDS in the country. The participants in the survey were all women aged 15 – 49 (see Figure 1.4: HIV sentinel survey 2005, HSS). The median for the country was 4.4; North-central has the highest prevalence of 6.1 and the lowest prevalence was the south-west with 2.6 (FMOH, 2006).

Figure 1.4 National HIV prevalence by location, HSS 2005 [FMOH, 2006]

In the same year, the FMOH carried out an estimated analysis on the rural areas and urban centres in the different states of the south west regions (the outcomes are shown in Figure 1.5). The rural areas of Ogun State have the highest prevalence of 6.0% while the lowest was 1.0% in the rural areas of Osun State in the SW region. The urban area of Ondo State has the highest HIV prevalence of 3.8% and the lowest was Ekiti State with a HIV prevalence of 1.7%. The outcome poses challenges for both the Federal Government and States Government.

Figure 1.5 HIV/AIDS prevalence six states in the SW zones (rural/urban) [FMOH 2006]

The analysis of the survey poses an immediate challenge to the health sector. Currently, according to FMOH (2009), the Federal Government of Nigeria has created centres in all the teaching hospitals of the federation and state university hospitals for free treatments and encouraged basic and operational research for biomedical personnel in the country.

1.4 Challenges in the Nigerian federal health sector

The Nigeria healthcare sector has many challenges: according to Stuti (2005), local governments should be accountable for the provision of healthcare in Nigeria, but the federal authority has failed to provide adequate support for the local government biomedical staff. The following prevailing factors face the Nigerian health sectors:

- Lack of health personnel, language and transportation
- Insufficient training, salary issues and funding
- Lack of demand for research
- Institutional instability
- Inadequate facilities
- Lack of scientific information and database
- Lack of a constant power supply (Abe and Omo-Aghoja, 2008).

1.5 Thesis overview

Chapter 2 is a Literature Review of HIV/AIDS transmission and prevention in the global context. The chapter identifies risk groups and factors of human vulnerability. It provides a brief review of healthcare information management systems and the information and communication technology (ICT) risk. Chapter 3 discusses the study guide, adopted research methodologies and data collection. Chapter 4 presents the research case study domain in its administrative divisions and demographic issues. It discusses the state of organisational activities related to HIV/AIDS in Lagos State of Nigeria. It identifies the Lagos State AIDS Control Agency (LSACA) as the State policy maker and discusses the operational activities. The chapter considers the healthcare system and challenges.

Chapter 5 presents a vivid analysis of the data collected in accordance to the Lagos State five divisions (Badagry, Epe, Ikeja, Ikorodu and Lagos Island). This analysis addresses the quantitative aspect through descriptive statistical analysis, complemented with inferential statistics to reveal the strength of the variables. The analysis produced an empirical research. Chapter 6 presents the research triangulation and validation. A conceptual KM framework is designed to address

the research knowledge gaps. In this chapter, a validated (eight NGOs) KM based framework is presented. Chapter 7 presents a detailed conclusion, recommendation and a contribution to knowledge.

1.6 Summary

The chapter has described the aims and objectives of this thesis. It has presented the Nigerian Government's policy on HIV/AIDS activities such as the formation of the National Agency for the Control of AIDS (NACA), State agencies and the role of non-governmental organisations (NGOs). The challenges facing Nigerian Federal Health Sector and thesis overview was highlighted in preparation for more detailed analysis later in this thesis.

2 Literature Review

Section 2.1 reviews the non-clinical literature regarding HIV/AIDS including such salient aspects as global perspectives, transmission, prevention, therapeutic measures and physical symptoms. Section 2.2 reviews Electronic health (E-Health) in order to unveil databases, mobile pharmacies, electronic portals and telemedicine as aggregate knowledge transfer tools. Section 2.3 presents E-Health in the Nigerian healthcare system. Section 2.4 describes the concept and efficacy of the Knowledge Management (KM) paradigm. The concludes (Section 2.5) with a short summary.

2.1 Human Immunodeficiency Virus / Acquired Immune Deficiency Syndrome (HIV/AIDS)

The human immunodeficiency virus (HIV) was first described in the early 1980s as the first human lentivirus from the retroviridae family by researchers from the developed world who were working in the fields of virology and pathology. Kanki *et al.* (2004) confirmed that HIV was the causative agent of acquired immune deficiency syndrome (AIDS) as discovered by Gallo (1984). The HIV virus integrates and generates its genetic information into the DNA of the host (patient). Researchers in virology have found that the virus particles generate with a very high replication system of 10^{12} each day. According to Hunt (2009), three million people around the world die of HIV/AIDS each year and the initial statement of the National Intelligence Council (2002) suggests that, Nigeria, India, South Africa, Ethiopia, China and Russia will shoulder the heaviest burden of HIV infection. HIV/AIDS was first reported in Lagos, Nigeria in 1985 (FMoH, 1985) and twenty-two million people are living with HIV infection in Sub-Saharan Africa. Figure 2.1 illustrates HIV/AIDS-mortality trends:

Figure 2.1 HIV/AIDS trends [Volberding and Sande, 2008]

The Federal Government of Nigeria pronounced HIV/AIDS as the major challenges facing the health sector in 2000 (FMOH, 2000). National Action Committees on AIDS (FMOH 2000) were constituted to design responsibilities for the three tiers of the Government (Federal, State and Local authorities). Their burdens and challenges are partially shared with non-governmental organisations (NGOs) and international organisations working on HIV/AIDS. Kanki *et. al*. (2004) claimed that the current evaluation in Nigeria calls for increased concern as the mortality projection for 2010 is 1,000,000 leading to 2,000,000 orphans and this is the highest in the world.

2.1.1 Types of HIV

According to Kanki *et al.* (2004), viral studies have led to grouping HIV in terms of genetic (replication) diversity and geographical distribution. Meloni *et al.* (2004) described the molecular complexity characteristic of HIV subtypes and the use of polymerase chain reaction (PCR) for detection of HIV in dual hosts or carriers. Olaleye, 1997 (cited in Kanki and Adeyi, 2004) first described the circulation of multiple viral subtypes as a unique heterogeneous distribution of HIV naming circulating recombinant forms (CRF). He considered the prototype strain (CRF) as

the first in West Africa. It was called "IbNG" - meaning Ibadan-Nigeria. Researchers (Meloni, Kanki and Adeyi) in immunology and virology grouped HIV into HIV-1 and HIV-2 genetically.

- **HIV-1:** It exists in subtypes of A-D, F-H, J, K and circulating recombinant forms (CRFs). All subtypes are common in Nigeria; Subtype B is common in Americas, Western Europe and Australia which accounts for 12.3% of infection cases worldwide. Subtype C is common in Southern African, East African countries and India which account for 47% of infection cases worldwide.

- **HIV-2**: This was discovered as a new strain. It has similar symptoms to HIV-1 but there are some clinical discrepancies in the pathological analysis. Hunt (2009) confirmed that, HIV-2 is mostly restricted to West African nations and rarely found elsewhere.

2.1.2 HIV/AIDS risk groups

HIV/AIDS risk groups were identified by researchers and non-governmental organisation working on HIV/AIDS global initiatives. Olawoye *et al.* (2007) listed the following as potential risk groups in the global HIV/AIDS population:

- Commercial sex workers (CSW)
- Itinerary travellers and long distant truck drivers
- Young students
- People with sexually transmitted diseases (STDs)

- Armed forces personnel and police officers as a result of incessant job mobility (transfer).
- Local area overnight marketers
- Intravenous drug users and drug abusers (IDU)
- Traditional surgical practice and occult societies
- Health workers as a hazard of their work, particularly needle stick injuries
- Refugees are vulnerable due to rape and poverty
- Migrants and international jobbers

2.1.3 Routes of HIV transmission

Adeniyi *et al*. (2006) described a study regarding the route of transmission of HIV/AIDS in the world population. This was a complex case study due to behavioural factors militating against HIV education, awareness and prevention in the population group; these included religion and cultural practices. HIV/AIDS is transmitted from an infected person to another and it has become a worldwide epidemic today. HIV/AIDS Routes include:

2.1.3.1 Sexual transmission

HIV/AIDS spread through sexual contact accounts for 75-80 per cent of the cases in the world (Adeniyi, 2006). Sexual transmission of HIV/AIDS accounts for the major mode of HIV spread in Europe and the United States of America. The World Health Organisation HIV/AIDS expert group (2003) reaffirmed in Geneva that, unsafe sexual activities are responsible for most of the HIV infection in Sub-Saharan Africa and other modes of transmission are secondary. The incidence of homosexual and

drug use in the Eastern block of Europe contribute to the prevalence of HIV/AIDS (Lazarus *et al.* 2006).

The more infected sex partner(s) engage in sex, the higher the probability of spreading or contracting to the new patients. According to Adeniyi *et al.* (2006), cultural practices regarding sexual practices contribute to the prevalence of HIV/AIDS in population groups such as in Sub-Sahara Africa. Clinical analysis of unprotected sexual practices has proved that male-to-female transmission is higher than female-to-male transmission and men tend to be more sexually active in a relationship than women in heterosexual populations (Nasidi and Tekena 2004).

2.1.3.2 Extra-marital affairs

Olawoye *et al.* (2007) found that having sexual relation outside marriage contributed to HIV/AIDS prevalence in Nigeria. Despite the fact that Nigeria claims to be the most religious country in Africa, extra-marital affairs still account for greater prevalence issue in all regions of the country. According to the opinion of stakeholders working on HIV/AIDS initiatives, poverty and behavioural issues contributes to extra-marital affairs in public location of Nigerian cities.

2.1.3.3 Prostitution

Prostitution is a global issue and studies have shown that people migrate from country to country to engage in prostitution; according to the BBC (2001), the Federal Government of Nigeria reported on a particular tribe engaging in child trafficking to take prostitution jobs in Europe. Table 2.1 shows the number of migrant sex workers in the European Union.

Countries (EU)	Africa	Asia and Africa	Africa and Latin America	Asia	Balkan states	Eastern Europe	Latin America	Other
Austria		5%				70%	25%	
Belgium								55-70%
Denmark				75%				
Greece	2%		5%	2%	40%	50%		1%
Holland		30%				18.5%	18%	33%
Italy	54%					30%	16%	
(Norway)				50%		20-25%	25-30%	
Spain	65%						25%	10%
Sweden	15%			3%		35%	30%	17%

Table 2.1 Statistic of migrant sex workers in the European Union

<http://people.exeter.ac.uk/watupman/undergrad/aac/eu_mobility.htm> [March 7, 2010]

According to the U.S Department of Labour's Bureau of International Labour Affairs, children ranging from 10-14 years are trafficked to Nigeria from neighbouring countries to engage in forced work as domestic workers, prostitutes and other forced labour conditions. Olawoye (2007) describes child trafficking as a potential factor contributing to the prevalence of HIV/AIDS in Nigerian cities. Children often have little or no knowledge about HIV/AIDS transmission and pose a potential **risk group.**

2.1.3.4 Polygamy

Polygamy is related to tradition, culture, custom, norms and religion in Africa and Middle-East. In the religious context, some Muslims strictly follow the saying of the holy Prophet Mohammed (SAW) and Quran. Researchers think that the more the actors in the marriage union, the more the risk of HIV/AIDS and other sexual infections. According to the United Nation (2008), polygamy, widow inheritance, multiple female partners and extramarital affairs has increased the vulnerability to HIV/AIDS in Swaziland and South Africa. In African nations, member of some Royal family believe in polygamy and traditional norms dictate that it should be practiced in order to increase the probability of a male birth. In Nigerian custom, polygamy is common and studies have identified it as a factor contributing to the prevalence of HIV/AIDS. Polygamy is practiced in all northern states of Nigeria but less so in the south.

2.1.3.5 High divorce and re-marriage rates

Legal marriage union dissolution is most common issue in Europe and the United States of America and has risen sharply in the last two decades (Chan and Halpin, 2002). The trend of family formation (re-marriage) and dissolution are similar in the United Kingdom. In other countries of high prevalence of HIV/AIDS, marriage dissolution and formation have posed a negative influence in the population group. Traditional marriage in Nigeria has little legal backing in the dissolution process by the traditional Leaders or the customary court. Traditional marriage dissolution and formation are common in the rural communities of Nigeria. Ajuwon *et al*. (1995) described divorce and re-marriage as one of the key route of HIV/AIDS transmission

into the Nigerian rural communities. Casual sex that takes place between divorce and re-union contribute to the prevalence of HIV/AIDS.

2.1.3.6 Widow inheritance and wives sharing

Widow inheritance and wife sharing are cultural practices in the continent of Africa. In Nigeria, customary law supports widow inheritance but the condition of inheritance varies from culture to culture. According to Olawoye *et al*. (2007), widow inheritance is fading-out in the cities (urban) of Nigeria while the practice still active in rural areas of the country. This is a common practice in the West African rural areas and potentially contributes to the prevalence of HIV/AIDS in the region. Ososanya and William (1994) stated that rural-urban mobility is high with respect to lack of social factors in the rural areas. The factors are crude and have great influence on HIV/AIDS prevention exercise in the urban centres.

2.1.3.7 Parental and materno-foetal HIV transmission

Parental activities and care have contributed to the prevalence of HIV/AIDS in third world countries as result of lack in the basic knowledge of HIV/AIDS transmission. First aid responses to domestic injuries and blood transfusion by parents have been identified as route of transmission of HIV/AIDS. According to Mann *et al*. (1986), ninety per cent (90%) of people who receive infected blood acquire the HIV infection. According to Olawoye *et al*. (2007), ten percent (10%) of HIV/AIDS cases in the world are transmitted from mother to child either during the antenatal (pregnancy) or postnatal stage. In mother-to-child transmission (MTCT), HIV can be transmitted from mother to baby during: (i) utero, (ii) birth and (iii) through breast feeding.

Newell and Thorne (2006) stated child breast feeding account for 70% of infection cases and utero (birth) account for 40% of children born with HIV. The absence of HIV/AIDS transmission knowledge in mothers has a negative influence on the prevalence of HIV during the birth and postnatal period. It is estimated that 20-40% of infants born as HIV seropositive have been infected by their mother. In addition, traditional births attendants (TBAs) during local birth have contributed to the prevalence of HIV through the use of unsterilized equipment and bare hands. More local midwives exist more in the rural areas of Nigeria than the urban centres and perform delivery with little or no knowledge of infection control.

2.1.3.8 Contaminated blood, blood product and sharp

Infected HIV blood causes contamination (infection) through careless handling and negligence and spans: (i) blood transfusion, (ii) inadvertent transmission - drug and intravenous, (iii) accidental transmission (healthcare workers dealing infected bloods) and (iv) rare transmission. Transplanting of infected organ and tissues and the use of sharp objects (needles, razors etc) from HIV infected clients contributes to the current prevalence of HIV/AIDS (Olivier 2010). Mishandling and misuse of equipment during insemination (both product and semen) and transmission through HIV-infected equipment during insemination into the virginal and anus are routes of infection (Nasidi and Tekena 2004).

2.1.4 HIV/AIDS risk factors (influencing HIV transmission)

Factors influencing HIV/AIDS have been studied in both controlled and un-controlled environments to try to understand the epidemic rate. Todd *et al.* (2006) applied knowledge of sexual transmitted infections (STIs) in the rural area of

Tanzania to describe factors influencing the HIV transmission. Studies have described sexual behaviour, individualism and biomedical cofactors as influencing the risk of transmission of HIV/AIDS. Other identified factors are now detailed.

2.1.4.1 Individual ignorance on HIV/AIDS

Basic individual understanding on HIV/AID transmission and management varies in the community. In the developing nations, the level of awareness of both transmission and ways of managing HIV/AIDS is lower compared to the developed nations (Deacon *et al*. 2005). According to various researchers such as Adeniyi *et al*. (2006) and Olawoye (2007), ignorance and individual understanding on HIV/AIDS contributes to the prevalence of the disease. HIV/AIDS transmission mediates around ignorant, concentrated more in the region of less awareness and population-based Cheemeh *et al*. (2006).

2.1.4.2 High illiteracy level

Levels of formal education have a great impact on healthcare knowledge in both therapeutic measures and disease epidemiology. In the analysis of the current HIV/AIDS epidemics in Africa, there was clear impact of health illiteracy in both rural areas and the urban centres. The general literacy on the population base is an important determinant of epidemiology in healthcare. This is another challenging factor contributing to the HIV/AIDS prevalence in developing nations as described by Kickbusch (2001). Kalichman and Rompa (2000) state that "Poor health literacy is a prevalent barrier to medical care and people with lower health literacy experience greater illness severity than people with higher health literacy". The illiteracy of people with HIV/AIDS has contributed to the spreading of HIV/AIDS.

2.1.4.3 Sex education

Globally, sex education is an important index in the analysis of the HIV/AIDS epidemic. Researchers have evaluated the impact of sex education in the prevalence of HIV/AIDS in both developed nations and developing nations. Oakley *et al*. (1995), described the behaviour of adolescents as a factor that could contribute to the spreading of HIV/AIDS in the developed world. Schools in developed nations aim to increase students' knowledge of sex education and prevent the spread of Sexually Transmitted Infections (STIs) and HIV/AIDS. Different approaches have been used for at different developmental stages (Santelli *et. al*. 2006). According to the United Nations, the lacks of sex education in African schools have caused an increase in HIV/AIDS (Gallant and Maticka-Tyndale, 2004). People living with HIV/AIDS and have little or no sex education and have contributed to the increase HIV/AIDS.

2.1.4.4 Poverty

HIV/AIDS is a major threat to the development, economic growth and poverty alleviation in much of Africa (Whiteside, 2002). Poverty caused the increase in commercial sex workers (CSW) in the world and has reduced the clinical trials of people leaving with HIV/AIDS in Africa despite the contribution of the United Nations (Cargill and Stone, 2005; and Attaran, 2001).

2.1.4.5 Political instability

Political instability has called for radical changes in HIV/AIDS treatment and care policies in the developing nations. The United Nations (2006) identified political instability as a factor affecting the spread of HIV/AIDS in the developing nations like Haiti and some African nations. In 2001, UN members met to declare standards

for HIV/AIDS in their respective nations for the new millennium, on meeting again in 2006, they observed that many countries had changed Government and policy makers, thereby affecting their policies to tackle HIV/AIDS. According Elbe (2006), there is the possibility of linking HIV to security operations and the international community. The movement of Nigerian servicemen in the peace keeping operation in Liberia, Rwanda and Burundi have been noted as a factor influencing HIV/AIDS prevalence in the Nigerian Military Forces. Nwokoji and Aujuwon (2004), acknowledge the spread of HIV growth among the military personnel and the Nigeria police officers. The study described "Knowledge of AIDS and HIV-risk sexual behaviour of naval personnel in Lagos Nigeria". Political Instability has been identified as a factor contributing to the prevalence of HIV/AIDS linkage to Policy and Security (Mulanga *et al.*, 2004).

2.1.4.6 Breast feeding

Promotion of Exclusive Breast Feeding (EBF) at early birth has caused increase in HIV-1 postnatal transmission (PNT). Miotti *et al.* (1999) described the effect of breast feeding in the HIV/AIDS transmission in Malawi. The study shows that over half a million infants acquire HIV-1 from their mother through EBF are mainly in developing nations. The research proved that 90% of infected infant acquired the epidemic through early EBF. Embree and Njenga (2000) identified various factors responsible for HIV-1 during post-natal transmission (these being maternal nipple lesions, maternal CD4 cell count and mastitis).

2.1.4.7 Cultural related practice

According to Olawoye *et al.* (2007), Nigeria and many countries in Africa embrace some cultural practices which aid prevalence of HIV in the country. Some of these practices are highlighted below:

- Head and beard shaving - common among Muslims (north Nigeria),
- Tattooing - associated with women from both south-west and north-north of Nigeria as cosmetic and designs,
- Ear and nose– piercing - cultural practices performed on young females without knowledge of sterilization, as is the culture in the south-west and north-north of Nigeria,
- Tribal marks and Incisions - cultural practices in the rural areas of Nigeria with the use of sharps and razors in making tribal marks on the face and body,
- Scarifice and occultic activities - practices that adhere to traditional norms in southern Nigeria - this may involve dealing with human blood without knowledge of blood screening and handling,
- Traditional birth attendance (TBAs) activities - the attendants are traditional herbalists who specialise in the delivery of pregnant woman,
- Circumcision - male circumcision is associated with religion and performed locally in Nigeria; female circumcisions are common in the southern part of Nigeria,
- Bride Price - a custom in the eastern and western parts of Africa. It is commonly termed "wife price" and the price varies from culture to culture. In the eastern part of Nigeria, a wife is valued in terms of education, beauty

and the family background. High bride prices in eastern Nigeria have resulted in premarital affairs, prostitution, engaging in casual sex and human trafficking. These contribute to the transmission of sexual transmitted diseases (STDs) and HIV/AIDS (Foster and Williamson, 2000).

2.1.5 HIV/AIDS global demographic view

The global impact of the HIV/AIDS epidemic has exceeded predictions in the last two decades. HIV/AIDS has altered the global projection on social capital, population structure and economic growth (Piot and Bartos, 2001). Figure 2.2 shows the progression of HIV/AIDS prevalence from 1980 to 2003.

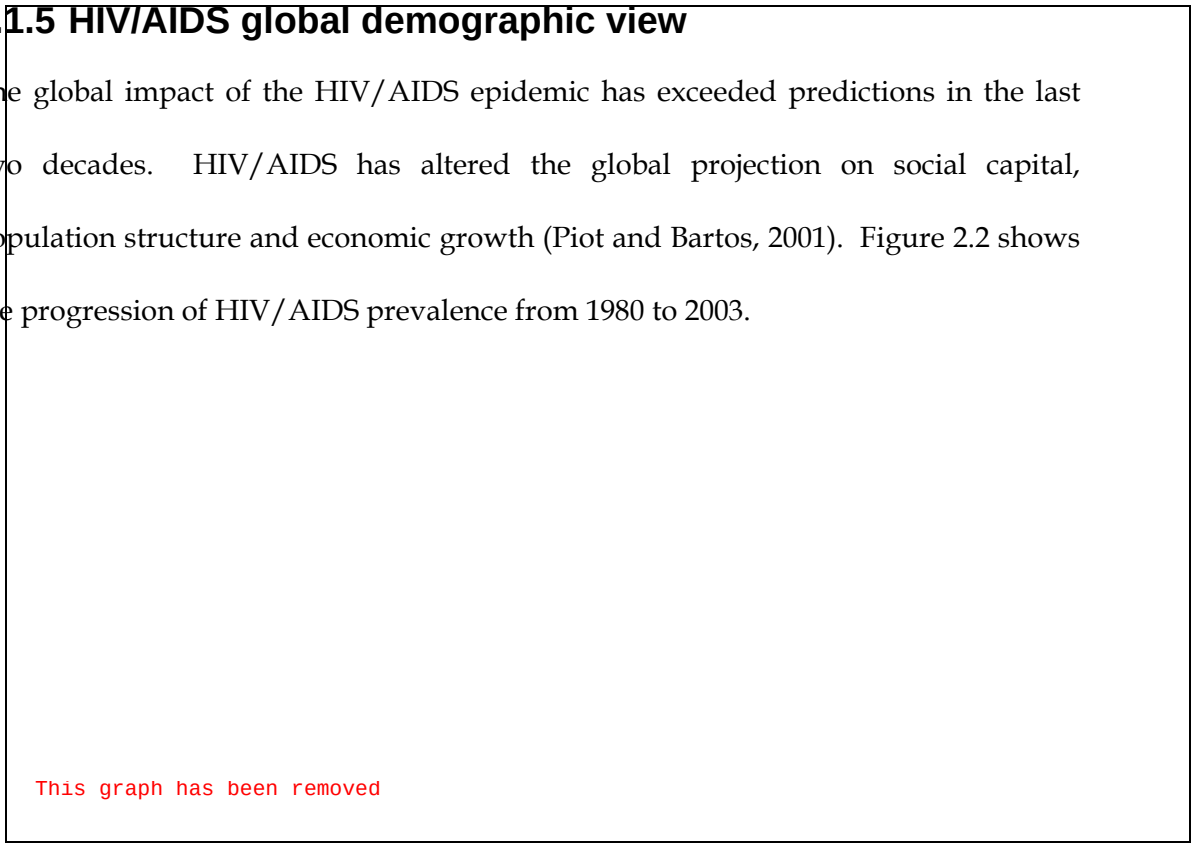


Figure 2.2 HIV/AIDS global demographic view.
<http://nejm.highwire.org/cgi/content/full/351/2/115/F1> [April 5, 2010]

Table 2.2 shows the global view of HIV/AIDS in 2006.

Regions in 2005	PLWHA	New Infections	AIDS deaths	Adult Prevalence %
Sub-Saharan Africa	24.5 million	2.7 million	2 million	6.1%
Asia	8.3 million	930, 000	600, 000	0.4%
Latin America	1.6 million	140, 000	59, 000	0.5%
North America and Western Central Europe	2 million	65, 000	30, 000	0.5%
Eastern Europe and Central Asia	1.5 million	220, 000	53, 000	0.8%
Middle-East and North Africa	440, 000	64, 000	37, 000	0.2%
Caribbean	330, 000	37, 000	27, 000	1.6%
Oceania	78, 000	7,200	3,400	0.3%
Total	**38.6 million**	**4.1 million**	**2.8 million**	**1%**

Table 2.2 HIV/AIDS regional statistics in 2006
[WHO: Global fact and figure 2006]

2.1.5.1 HIV/AIDS demographic view in Sub-Sahara Africa

The child mortality rate in Sub-Saharan Africa changed due to the campaign of encouraging breast feeding. This resulted in the increase of HIV-1 virus (mother-to-children transmission). According to Angus *et al*. (1994), for children less than five years of age there is likely to be substantial increases in child mortality in Sub-Saharan Africa due to HIV-1 infection. They described the main cause of this to be the scale of the epidemic among parents and suggested that adequate health services in African urban areas could control the illness and reduce child mortality rate. The implication of HIV/AIDS on the socioeconomics of Sub-Saharan African countries has a geometric effect in the region (Kanki *et. al*. 2004). Olawoye *et al*. (2007) state that, over twenty-five million people are living with HIV/AIDS in the Sub-Saharan

African region. He described the prevalence of HIV/AIDS as a negative factor in the health sector.

2.1.5.2 HIV/AIDS demographic view in North Africa and Middle East

According to Obermeyer (WHO, 2006), the problem of HIV/AIDS in the Middle East and North Africa is contradictory as the people of the region believe that the problem is minimal due to their obedience to Islam. The common statement of the Political Leaders and Head of State in the region is "Not in our region". The World Health Organisation (WHO) global analysis (2006) provides clear indications that there is a lower prevalence of HIV/AIDS in the Middle East and North Africa region when compared to other areas. The WHO identified causative factor of HIV/AIDS prevalence in Libya and Algeria to be injection of drugs by addicts. The Algerian health sector is currently experiencing a of HIV/AIDS epidemic among pregnant women as a result of drug use. Incarceration and long prison sentences for drug users in Iran, has drastically increased the incidence of HIV/AIDS in prison. Drug users in Iran and Algeria commonly exchange money for sex and sex for drugs, and unprotected sex account for over 15% of the Tehran HIV prevalence. The concern of international communities is that people from North Africa and Middle East of this region are reluctant to learn about HIV/AIDS and tackle the epidemic (WHO, 2006).

2.1.5.3 HIV/AIDS demographic view in North America

The spread of HIV/AIDS in North America has been under control for the last two decades due to technological advancement, HIV/AIDS education and media awareness. Karon *et al*. (2001) described the mode of transmission as heterosexual

contact, drug injection and homosexual practices. Youth living on the streets Canada were identified to be at risk of HIV/AIDS infection, with their risk increasing with age as a result of them engaging in unprotected (same or opposite) sex, intravenous drugs use and prostitution. These factors provide a challenge for government and public health officials (DeMatteo, 1999). The WHO (2006) stated that HIV has reached its highest level with 1.2 million people living with HIV/AIDS. This report described the National adult HIV prevalence to be 0.6%. HIV/AIDS has been identified as a factor responsible for mortality rate among African-American women in the age population of 25-34.

2.1.5.4 HIV/AIDS demographic view in Latin America and Caribbean

According to WHO (2006), over 32,000 children were living with HIV/AIDS in 2005 and AIDS claimed 59,000 lives. Collectively, there are over 1.6 million people living with HIV/AIDS in the Latin America. Homosexuality is common among men in this region and another significant mode of transmission is from female sex workers. The level of HIV/AIDS infection and epidemiology in the Latin America countries ranges between 2% and 28%. Bastos (1999) described how 60% of people living with HIV/AIDS in Brazil acquired the infection through intravenous drug injections. WHO (2006) reaffirmed that the HIV rapid transmission in Brazil is related to unsafe injection of drugs and unprotected sex among people aged 15-24. The national HIV/AIDS prevalence in 2005 in Brazil was 0.5%.

In 2005 there were over 130,000 people living with HIV, which is 0.6%. Factors responsible for the HIV/AIDS transmission in Argentina were identified as

intravenous drugs injection and unprotected sex. One in three drug users is described to be HIV positive in Argentina. A WHO (2004) survey confirmed that 17% to 28% of the people in the prisons of Argentina were HIV positive. Unprotected sex and intravenous drugs injection are the main routes of HIV/AIDS transmission in Bolivia, Chile, Costa Rica, Cities of Ecuador (prevalence are between 17% and 23%) and Peru (23%). Sex workers are more common in Colombia and this is a common cause of mother-to-child transmission. HIV infection levels are as high as 20%. Mexico has the lowest adult HIV prevalence of 0.3%.

2.1.5.5 HIV/AIDS demographic view in Western Europe

HIV/AIDS incidence rate in Western Europe increase by 20% between 1995 and 2000. There has also been any increased rate of sexual transmitted infections (STIs) such as gonorrhoea and syphilis in the following countries: France, the Netherlands, Sweden, Switzerland and the United Kingdom and this can be used as an index for HIV/AIDS epidemiology in Western Europe. The main routes for transmission of HIV/AIDS in Europe are sex workers, intravenous drug users (IDU) and the military (Nicoll and Harmer, 2002).

The technical report of the European centre for HIV/AIDS (2008) confirmed that the main factors responsible for the HIV/AIDS epidemic in Europe are sex workers and IDU. Spain has the highest reported HIV prevalence in Western Europe with 38%, of which 17% are IDU (female). Italy has an HIV prevalence of 14% and sex workers is identified as the main mode of transmission. France has a national HIV prevalence of 11% of which IDU and sex workers are recognised as the main causes. The following countries in Western Europe, Ireland, Portugal, and Germany have

national HIV prevalence's ranging between 10% to 20% and IDU, is recognised to be an important agent of transmission. Belgium, Luxembourg, The Netherlands and Norway have a national HIV prevalence of less than 10% and IDU is a known mode of transmission (European Centre for the Epidemiological Monitoring of AIDS, 2007).

2.1.5.6 HIV/AIDS demographic view in Eastern Europe and Central Asia

Karl *et al*. (1999) described the use of intravenous drugs as a factor that could fuel a spread of HIV/AIDS in the Soviet Union. The high rate of syphilis among young people in the Soviet Union was identified by the respective public health sectors. These two factors are used to determine the demographic state of the HIV/AIDS epidemic in this region. Donoghoe *et al.* (2005) confirmed the threat of HIV/AIDS to health sectors, economic stability and human development in the countries of Eastern Europe and Central Asia. HIV/AIDS has flourished the region which has been a dramatic change in the last decade. According to the technical report of HIV/AIDS surveillance in Europe (2007), the incidence HIV/AIDS is higher in this region with respect to other European areas. There is a national prevalence of over 50%, many of whom are infected via IDU. Figure 2.3 shows a comparative graph of IDU infected with HIV.

Figure 2.3 HIV/AIDS through IDU in Eastern Europe and Central Asia (1999-2006).
<http://www.eurohiv.org/reports/report_76/pdf/report_eurohiv_76.pdf>
[April 8, 2010]

According to the Interagency Coalition on AIDS and Development (2008), the yearly facts and figures reaffirmed that the 66% of HIV cases in Russia was due to the IDU mode of transmission and 32% was due to sexual mode of transmission, with national prevalence of 1.1%. The IDU HIV/AIDS prevalence case in Ukraine is 70%, which has doubled since the last 2001 surveillance, with an estimated national prevalence of 1.4%. There is a 30% incidence among sex workers and the mode of transmission is by sexual contract.

In the Republic of Moldova, HIV/AIDS prevalence has more than doubled since their last surveillance in 2003 with 59% attributed to the sexual mode of transmission. Estonia has a national HIV/AIDS prevalence of 0.7%, of which 45% are due to the sexual mode of transmission. It was reported that HIV/AIDS prevalence in this

region is very high in pregnant women (ICAD, 2008). Belarus, Uzbekistan, Kazakhstan and Tajikistan have a low HIV/AIDS prevalence range from 0.1% to 0.3%. IDU is the driving factor of HIV/AIDS prevalence in the countries mentioned above (WHO, 2006).

2.1.5.7 HIV/AIDS demographic view in East Asia

The attention given by the political leaders in East Asia with regards to HIV/AIDS varies from country to country. The incidence of HIV/AIDS and other sexually transmitted infections is increasing in China. Factors that have been identified as contributing to this are increasing number of sex workers and frequency of prostitution (Ruxrungtham *et al*. 2004). Zhang (2008) confirmed the HIV/AIDS prevalence in China to be low with respect to the national population of 1.3 billion as the ratio of HIV/AIDS prevalence to the Chinese national population is 700,000/1.3billion. Zhang (2008) described the growth of HIV among sex workers, pregnant women and drug users in certain area. Figure 2.4 shows the annual growth of HIV/AIDS in China since 1985 to 2007.

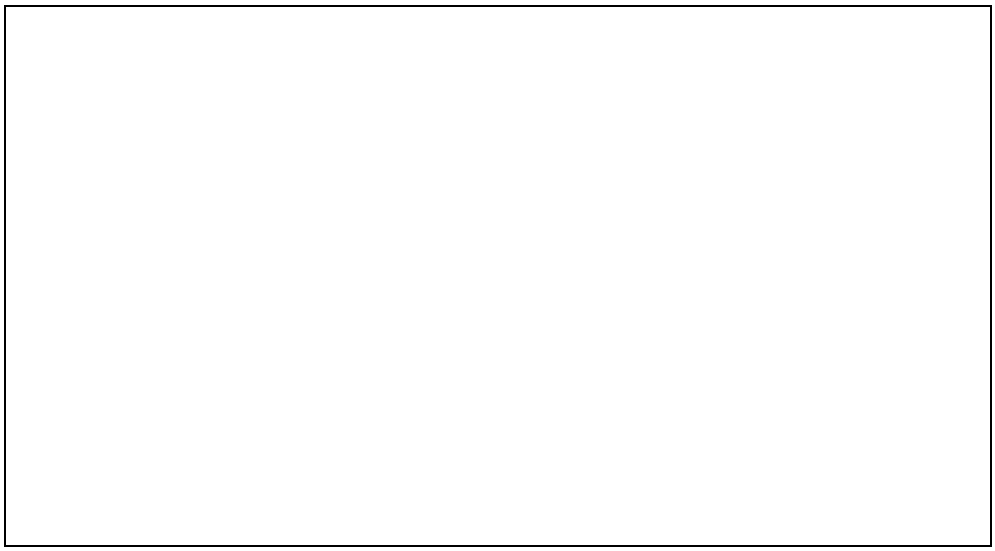


Figure 2.4 HIV/AIDS prevalence annual growth in China 1985 to 2007.
http://www.hiv-infrastructure.info/downloads/presentations/pres-00046.pdf [April, 16, 2010]

Zhang (2008) agreed with the United Nations (2006) report about factors causing HIV/AIDS transmission in China. These are sexual contact, blood donation and IDU. Figure 2.5 shows the modes of HIV/AIDS transmission in China.

Figure 2.5 HIV/AIDS transmission mode in China.
<http://www.hiv-infrastructure.info/downloads/presentations/pres-00046.pdf> [April 16, 2010]

Masahiro *et al*. (2003) considered the incidence of HIV/AIDS in Japan from 1984 to 2000; they identified the growth of the HIV epidemic among young people and described the main causes as sexual activities, induced abortion among sex workers and IDU. WHO (2006) surveillance confirmed that over 50% of people living with HIV/AIDS are female with 44% of them are sex workers. Vietnam and Thailand recently recorded outbreaks of HIV in their countries with high prevalence among those aged between 15-24 years old (United Nations Epidemic Monitoring Team, 2006).

2.1.5.8 HIV/AIDS demographic view in South and South East Asia

The incidence of HIV prevalence in South East Asia has shown an alarming growth in the last decade with respect to other parts of the world. Over 8.3million people are currently living with HIV/AIDS in South East Asia (WHO, 2006). Ruxrungtham *et al*. (2004) described the two main factors to be the increasing incidence of female sex workers and injecting drug users (IDU). Epidemics in Bangladesh and parts of India have massively contributed to mortality rate within the last decade. Figure 2.6 shows the progression of HIV and the driving factors (sex workers and IDU) in the populated Asian cities. Behavioural changes of people in Bangladesh have resulted in increases in the HIV prevalence and the mortality rate. Bangladesh lacks an extensive and intensive prevention campaign focusing on HIV/AIDS transmission that might have reduced risk related to sexual activities. According to WHO (2006), more than two-thirds of HIV/AIDS cases in Asia are from India and one-quarter of people living with HIV/AIDS are adult women. The adult national prevalence was 0.9% with 1.1% for pregnant women aged 15-24 years old.

Figure 2.6 HIV in the main Asian cities (Ruxrungtham *et al*. 2004)

Over 80% of HIV infections that are reported in India are due to unprotected heterosexual intercourse and IDU. Pakistan has over 85,000 people living with HIV/AIDS with a low national prevalence and strict measures against sex workers and IDU. 48% of HIV cases in Indonesia are transmitted through IDU (WHO, 2006).

2.1.5.9 HIV/AIDS demographic view in Oceania

WHO (2008) reports the Australian national adult HIV prevalence between ages of 15-49 years to be between 0.1% and 0.3% - see figure 2.7(a). Sexual activities are identified as the leading cause of HIV prevalence in Australia and the region as a whole. Figure 2.7(b) shows the growth of people living with HIV in Australia. The incidence of HIV/AIDS was low in New Zealand until the last decade, when their monitoring unit observed steep rise in the STI data due to sexual activities (Aceijas, 2004). Currently, HIV/AIDS is under control with adequate prevention and awareness activity, according to the United Nations (2008) - see Fig. 2.7(c). Figure 2.8(d) shows people living with HIV/AIDS in New Zealand. Many researchers confirmed that prevalence of HIV/AIDS in Oceania region is relatively low compared to other global regions.

Figure 2.7 (a) Australian adult HIV prevalence, 15-49%
[UNAIDS/WHO, 2008]

Figure 2.7 (b) Growth of people living with HIV in Australia
[UNAIDS/WHO, 2008]

Figure 2.7 (c) HIV prevalence in New Zealand
[UNAIDS/WHO, 2008]

Figure 2.7 (d) People Living with HIV/AIDS in New Zealand
[UNAIDS/WHO, 2008]

2.1.6 HIV/AIDS diagnosis and clinical symptoms

In the early stage of the HIV infection, the host remains asymptomatic (shows no symptoms) for quite a long time (Adeniyi *et al.* 2006). It is very difficult to identify People living with HIV/AIDS (PLWHA) in the community at the early stage unless an HIV test is carried out. This should be followed by HIV/AIDS counselling

regarding the result of the test. An HIV-infected person is diagnosed with AIDS when his or her immune system is seriously compromised and manifestations of HIV infection are severe (Olawoye *et al.* 2007).

2.1.6.1 HIV clinical phases

HIV/AIDS symptoms are complex to analyse as they are associated with a weakened immune system and people present with infections known as *opportunistic infections*. Statistics show that most cases of HIV/AIDS in Nigeria present with tuberculosis, loss of weight, meningitis, karposi sarcoma (skin redness cancer) and swollen glands. Olawoye *et al.* (2007) described the five phases of diagnosis and the clinical symptoms of HIV progression to AIDS.

- **The Acute Phase HIV**: This is the primary stage of the HIV infection, where antibodies appear in the blood (sero-conversion). This occurs between 6 and 12 weeks after infection, but the immune system can resist the infection for up to 8 months. The clinical manifestation and symptoms include fever, night sweating, headache and coughing.

- **The Latency Phase HIV**: In this second phase (also called "***viral latency***"), the virus remains dormant and lies inactive within the body cells as part of the viral life cycle of HIV. The patient looks and feels good but is already infected. This stage of transmission is referred to as a ***window period*** (asymptomatic stage).

- **Persistent Generalized Lymphadenopathy**: This is the stage where the blood cell (lymph nodes) diameter altered as a result of fluid or foreign substance due to a viral or bacterial infection. It is a continuous process of exchange of fluids between the HIV virus and the blood. At this stage, one-third of these patients show no clinical manifestation and symptoms.

- **AIDS - related complex (ARC)**: This is the stage where the immune system of the patient shows defects. At this stage, the symptoms may include as loss of weight, anorexia, abdominal, discomfort, diarrhoea with no specific cause, itching and enlargement of body membranes

- **AIDS**: According to Olawoye *et al.* (2007), this is the most severe stage of the HIV infection and is characterized by total breakdown of the immune system. Opportunistic infections and tumour(s) are expected and their type will depend on the patients' geographical region and environmental exposure. African AIDS patients are more likely to experience gastro-intestinal problems, tuberculosis, meningitis and tropical fevers. America and European AIDS patients are associated with AIDS dementia, autism, cancer (skin) and paraplegia.

2.1.6.2 HIV/AIDS diagnosis and clinical symptoms

The state of disorder of HIV/AIDS patients' skin is the first marker and indicator during the clinical symptom and diagnosis (Goldstein *et al.* 1997) where "the incidence and severity of the skin disorder increase as immune function deteriorates". The conditions of HIV/AIDS patients' skin are important in the

diagnosis and used to predict progression of immunodeficiency. The WHO confirmed that the clinical diagnosis of HIV includes four skin conditions which are Kaposis sarcoma, Herpes zoster, Herpes simplex and Pruritic maculopapular rash. These have been used to predict HIV seropositivity. Olawoye *et al*. (2007) reaffirmed that skin sero-positivity prediction ranging from 71 per cent to 98 per cent for people living with HIV/AIDS (PLWHA).

2.1.6.3 People leaving with HIV/AIDS (PLWHA) skin

Fantoni *et al*. (1997) state that the physical appearance of PLWHA reduces irrespective of healthcare quality as the immune system tends to zero. The skin conditions are the most indicative of HIV disease. PLWHA are prone to the following skin infections:

Viral infection: Viral infections are more widespread, aggressive, recurrent or chronic in HIV patients than non HIV infected patients. The most common viral skin infection common to HIV patients are:

Herpes Simplex virus – Herpes Simplex virus exist in two forms pathologically namely Herpes Simplex virus – 1 (HSV-1) and Herpes Simplex virus – 2 (HSV-2). The two forms of HSV-1 and HSV-2 are transmitted in different forms of the part of the body in question. HSV-1 is latent infection contagious and less severe while HSV-2 infection is acquired through sexual contact and causes genital sores and pain. HSV is common to women in HIV/AIDS risk groups and PLWHA (Whitley 1998). Figure 2.8 described manifested Herpes.

Figure 2.8 Herpes simplex virus.
<http://www.herpes-coldsores.com/std/herpes_pictures.htm> [April 13, 2010]

Herpes Zoster virus (Shingles) – This is caused by the varicella zoster virus (shingles) acquired during primary varicella infection or chickenpox as a result of deficiencies of the immune system. The causes of infection decrease immunity due to HIV, chemotherapy, malignancies or lack of macro nutrients in the body. Early symptoms are intense pain and a burning sensation in the infected body area for 4-5 days. It is a persistent infection in PLWHA (Stankus, 2000).

Fungal infection: There are various types of fungal skin infection, but there are specific types that common to HIV/AIDS-positive patients. According to Aly and Berger (1996), the prevalence of dermatophytosis is four times higher among HIV/AIDS infected people than normal healthy people. Common fungal skin infections are described below:

- Seborrheic Dermatitis (SD) – This is the most common fungal skin infection in HIV/AIDS-positive patients. SD is used as one of the clinical markers at earliest stage of the HIV/AIDS infection. It has a prevalence of 80% among HIV/AIDS patients. SD presents as scalp inflammation and an itchy, dry, scaly and extensive rash (Aly and Berger, 1996).

- Candidiasis (Thrush) – It is typically caused by "Candida Albican". It affects any part of the body, often the genitals part and severe cases may involve the digestive tract. On occasions it is life threatening, difficult to cure and may cause damage to organs. It is often severe in people whose immunity compromised such as HIV/AIDS-positive patients. (Olawoye *et al*., 2007)

Bacterial infection: HIV/AIDS-positive patients are secondarily infected with bacterial infections due to their low immune systems. Bacterial skin infections common to HIV/AIDS-positive patients are staphylococcus aureus and streptococcus species (Mylonakis and Calderwood, 2001). Staphylococcus aureus is referred to as "staph" in the healthcare community and affects the nose. It appears to be minor in the case of healthy people, presenting as pimples and boils due to slight fall in the immune system. It is severe for people with HIV/AIDS and may cover all of the body as with Methicillin-resistant Staphylococcus aureus MRSA (Peacock *et al*. 2001).

Puritic Maculopopular (Prurigo) – according to De-Francesco *et al*. (2006), prurigo is a skin lesion and occurs mainly on the neck, back and chest. It presents with abnormal changes in the skin tissue, along with a rash and itching. The next stage is associated with small irritating blisters. It is used as one of the markers of HIV infection at the early stage to confirm the state of infection as it has been shown to be one of the first signs of infection.

2.1.6.4 Sexually transmitted infection/diseases (HIV/AIDS risk factors)

Monitoring teams around the world have studied major epidemics of heterosexually transmitted HIV infections through STIs and STDs (Calentano *et al*. 1998) and there are clear indications that both ulcerative and non-ulcerative STDs promote and facilitate HIV/AIDS transmission through a direct complex biological mechanism. A global surveillance system to monitor STD and HIV trends has shown the behavioural interrelationship aiding HIV prevalence in the risk groups (Fleming and Wasserheit, 1999).

2.1.6.5 Gonorrhea

Gonorrhea is a common genital STD that facilitates HIV acquisition and it is used as a marker for unprotected sexual activity. Studies have shown that the increase in the incidence of gonorrhea has been associated with an increase in the incidence of HIV (Weir *et al*. 1994). According Do *et al*. (2001), people living with HIV/AIDS who engage in the type of sexual activities that are likely to result in gonorrhea may also transmit and contract HIV.

2.1.6.6 Syphilis

Syphilis is a bacterial infection caused by Treponema pallidum, which is usually transmitted through sexual contact. Epidemiological studies have established substantial evidence that the syphilis infection causes genital ulcer lesion disease which facilitates HIV transmission. Primary syphilis usually commences with a single sore called *chancre* and, if left untreated, this then develops into a rash, fever, swollen lymph nodes and ulcers. The investigation of the Syphilis outbreak between

2001 and 2003 in San Francisco and Los Angeles County showed the link with increases in the number of HIV cases (Buchacz *et al*. 2004).

Syphilis at a tertiary stage can be serious depending on the part of body that is infected. The infection may affect the brain, nerves, eyes, heart, bones, skin or blood vessels (UKNHS, 2010). According to the report by the Department of Health in the United States of America, more babies are born with syphilis in the U.S. due to high level of heterosexual community activities which could then lead to HIV infection mother-to-child transmission - MTCT (Reuter, 2010).

2.1.6.7 Genital Chlamydia

According to the study of the out-break of STDs among sex workers in Bangladesh, genital Chlamydia was detected as a marker in the HIV transmission chain using a polymerized chain reaction in the pathogenesis analysis (Sarkar *et al*. 1998). Sex workers were declared as a high risk group in this period of the genital Chlamydia epidemic. Golden *et al*. (2003) reaffirmed that chlamydia can act as a power line for HIV virus transmission and the research suggested there should be programs to increase the public's awareness of this.

2.1.6.8 Genital Warts

Genital Warts are a viral disease and one of the risk factors for HIV virus transmission. The genital warts analysis of Carter *et al*. (2005) included homosexuals and bisexuals. It concluded that the chance of HIV transmission is higher in groups where some of the members have been confirmed as HIV-positive or as having genital warts. According to studies of HIV incidence among partners with known

HIV status carried out by Italian Study Group on HIV Heterosexual Transmissions, (Lazzarin *et al*. 1991), the transmission rate is higher for couples who have genital warts and engage in anal sex. The general analysis on the genital warts is that they facilitate HIV transmission by sexual contact between infected people.

2.1.6.9 Trichomoniasis

The clinical analysis of Chesson *et al*. (2004) shows that trichomoniasis facilitates the sexual transmission of the HIV virus in women in the United States. Preventing and curing trichomoniasis could have a great impact on HIV incidence and prevalence. Sorvillo *et al*. (2001) reaffirmed that trichonomas vaginalis is an amplifying co-factor in HIV incidence in African-American communities of the United States of America and indicated that it is one of the most common STDs in the urban centres of the United States of America.

2.1.6.10 Non-Specific Urethritis

Non-Specific Urethritis is identified as a risk factor among STIs that contributed to HIV prevalence in the sexual population. According to the analysis of the trends of HIV infection and STIs, non-specific urethritis is considered to be a risk factor along with other severe STDs treated in primary care units in the United Kingdom in 1990-2000 (Cassel *et al*. 2006). Non-specific Urethritis is classified as one the STI with acute antibody-negative activity that is associated with HIV transmission. This was discovered during the evidence-based analysis of men with acute HIV infection in Malawi (Pilcher *et al*. 2004). Suligoi and Giuliani (1997) reaffirmed that non-specific urethritis has contributed 5% to the overall cases of HIV prevalence associated with foreigners in Italy and it is used as one of the STD indicators of HIV incidence.

2.1.6.11 Chancroid

Chancroid is one of the first STDs that were identified as risk factor in the transmission of the HIV virus in Africa among heterosexual groups with severe genital ulceration. Chancroid is common among sex workers in countries with higher HIV prevalence. The partners of sex workers can easily contract chancroid from the infected host. The public health data proved that the incidence chancroid has sharply declined in Europe and North America in the last decade (Steen, 2001). According to Weisis *et al.* (2006), male circumcision reduces the risk of HIV infection through the reduction of the fleshy groove on the male genital, reducing the opportunity for bacteria to build up. Their studies confirmed that circumcised males are at lower risk of chancroid and syphilis genital ulceration.

2.1.6.12 Hepatitis B or C

Soriano *et al*. (2006) found that one-third of people who have HIV also suffer from chronic hepatitis C. Of these, 75% of the HIV was contacted through blood borne transmission either via sexual contact or intravenous drug injection. In southeast of Asia, 10% of HIV-infected patients suffer chronic hepatitis B virus (HBV). Patients with chronic HCV or HBV are recommended for antiretroviral therapy as both diseases affect the liver and cause cancer. The study of a hepatitis B and C virus outbreak in the Republic of Ireland prison population by Allwright *et al.* (2000) reaffirmed that HCV is a risk factor for HIV through intravenous drug use. Similar finding were found in a United States of America prisons where IDU and sexual behaviour were identified as causative factors (Weinbaum *et al*. 2005).

2.1.6.13 Candidiasis

Sangeorzan *et al.* (1994) found candidiasis and thrush to be associated with HIV and Spinillo *et al.* (1994) found 61% of the women with HIV seropositive had symptomatic vaginal candidiasis. According to Greenspan (1994), oral candidiasis is a common clinical feature of HIV infection and is used as an AIDS marker. It exists in different forms such as C. albicans and the recommended treatment is strong antifungal agents along with an antibiotic.

2.1.6.14 Granuloma Inguinale

Granuloma Inguinale is a bacterium that is recognised as one of the genital ulcer diseases (GUD) that facilitate HIV virus transmission. GUDs cause lesions that expose the sexual organ to HIV transmission during sexual contact that the genital tissue erosion in granuloma inguinale is responsible for HIV virus contraction. When associated with HIV, the erosion could cause even greater tissue destruction from the skin, organs, the bladder and bones. According to Wu *et al*. (2004), some GUDs like granuloma inguinale are under reported but facilitate HIV virus transmission in the process of sexual acts. Genital Inguinale is common in the tropical and semitropical regions like Brazil, the Caribbean, South America, South Africa and the South-East of India.

2.1.6.15 HIV prevention

HIV prevention strategies have altered the epidemic figures in many countries including addressing the behavioural issues associated with HIV infection transmission. Volberding and Sande, (2008) identified the three basic means of HIV transmission: (i) sexual contact transmission, (ii) blood-borne transmission and (iii)

mother-to-child transmission. They described the behavioural response in the income countries as a factor militating against HIV prevention strategies while high income countries have the opportunity to promote HIV prevention strategies to efficacy level.

2.1.6.16 HIV sexual transmission prevention strategies

HIV sexual transmission accounts for 85 per cent of HIV cases in the world (Royce *et al.* 1997). According Volberding and Sande (2008), behavioural challenges are the main factors responsible for HIV prevalence and following are effective strategies for reducing HIV sexual transmission:

- Condom promotion
- Peer-based programs
- School-based sex education
- Targeted counselling and behaviour change communication
- Community intervention Voluntary counselling and testing (VCT)
- Volunteer STD screening and treatment

2.1.6.17 Blood-borne transmission prevention strategies

Researchers have analysed the mode of transmission of HIV infection with respect to blood exchange; Gostin *et al.* (1997) reaffirmed the importance of blood-borne transmission for IDUs and biomedical staff working with HIV/AIDS patients' blood specimens. Volberding and Sande (2008) demonstrated effective strategies for biomedical staff to reduce the risk of contracting the HIV infection through intravenous means. The following are proven effective strategies to reduce the risk of blood-borne transmission:

- Needle and Syringe Exchange
- Drug substitution programs
- Counselling and condom provision
- Implementation of blood safety practice
- Proper infection control in the healthcare environment
- Post-exposure prophylaxis for biomedical staff.

2.1.6.18 Preventing mother-to-child transmission (PMTCT) strategies

According to the analysis of mother-to-child transmission, parental efforts play key roles in the prevention strategies. These include people living with HIV/AIDS attending a primary care unit before and after birth, reproductive health services and attendance at mother and new born baby programs. The availability of resources and technological advancement in the developed world support programs for mother-to-child transmission in both clinical trials and therapeutic measures. In low income countries, PMTCT has been less effective due to prevailing factors mitigating HIV prevention programs and lack of prenatal care and services. 90% of HIV cases in children are contacted through their parents in the Sub-Saharan Africa region (Volberding and Sande, 2008). The following are the effective proven PMTCT strategies:

- Campaign for caesarean section delivery
- Breast feeding alternative
- Reproductive health services
- Antiretroviral therapy

Figure 2.9 (WHO, 2009), shows the global analysis of PMTCT between the low income and middle income nations on PMTCT. The schematic shows inactive PMTCT in West African and the central Africa nations.

Figure 2.9 Antiretroviral for PMTCT 2004-2008 (WHO, 2009) <http://www.who.int/hiv/data/pmtct_coverage.gif>.[April 20, 2010]

2.1.7 HIV therapeutic measures and organisation

The complex stage of HIV/AIDS care is the therapeutic clinical trials. Many researchers have grouped HIV/AIDS therapies into two: (i) therapy for PMTCT, (ii) therapy for people living with HIV/AIDS.

2.1.7.1 HIV vaccination

Developed nations in the western world are trying to manage HIV by researching into the diversity and complexity of the disease and producing vaccines. Clinical trials have been conducted in the developed world with healthy volunteers at low

risk of HIV infection to HIV-1 subtype-B (Common in America, Western Europe and Australia). The name of the vaccine is "ALVAC-HIV" (Mugerwa *et al*. 2002). The vaccine clinical trial was first introduced to Africa in Uganda for further trials in the developing nations. Data gathered by Mugerwa *et al*. (2002) enabled them to describe the barriers that militate against clinical trials (first vaccine) in Africa. These are:

- Scientific – manufacturers error or pharmaceutical error, risk to volunteers,
- Sociobehavioural – public misconceptions, media misinformation, political issues and religious factors.
- Ethical concerns, safety of the trial participants
- Adequate professional logistic factors
- Lack of regulatory control mechanism for biomedical staff.

Walker and Burton (2008) described the effort of scientists to develop an appropriate vaccine as elusive due to the biological properties and characteristics of the HIV virus. Scientists believe that behavioural change is the only means of stopping the transmission of the virus at the moment. Researchers are still facing the challenges of discovering a suitable vaccine for the HIV infection. The aim of the first clinical trial was to develop a vaccine to elicit strong cellular immunity against HIV infection. According to Sekaly (2008), research of a HIV vaccine has taken a new direction using DNA prime/poxvirus boost strategies in addressing the HIV host immune system.

2.1.7.2 HIV antiretroviral drugs and therapy

HIV antiretroviral drugs are developed to keep HIV virus under control in the transmission chain. The pathogenic complexity of HIV virus meant that the antiretroviral drug was not 100% active against all forms of the virus and other opportunistic infections, such as TB and shingles. According to Little *et. al*. (2002), the antiretroviral drug failed in people living with the HIV virus before therapy was available, due to the resistance that the virus built up in the system of the host.

Keeping people living with HIV virus in therapy is complex due to the rate of replication and mutation process of the virus. Antiretroviral drugs have been developed to reduce the rate of replication of the HIV virus in the infected host. The way they act is by disturbing the stages of pathogenesis (acute phase to AIDS) and hopefully altering the mortality rate. Antiretroviral drug therapy for pregnant women reduces the maternal-infant transmission of HIV-1, provided that all the precautions taken in the gestation period, during delivery and after delivery are strictly adhered to.

The efficacy of antiretroviral drugs therapy for HIV infected pregnant women is very high (Connor *et al*. 1994). The distribution and financial support on antiretroviral drugs to the third world nations still remain issues militating against AIDS related illness and life expectancy. HIV/AIDS awareness and education still remains an important factor in the developing nations. Antiretroviral drugs have little or no impact in the developing nations like Nigeria and all other West African countries as the factors militating against the management of the disease are complex and rare. The most common types of HIV in Nigeria are circulating recombinant forms (CRFs);

scientists are working hard to come out with suitable antiretroviral drugs for this type of HIV in the developing nations (Kanki and Adeyi, 2006).

2.1.7.3 United Nations (UN) and joint operations on HIV/AIDS

The UN constitutional policy is to monitor world mortality rate, health related threats, security related issues and enhance humanity needs such as education, food, clothing and shelter (Alf, 2008). Since the creation of the UN after the Second World War (WW II), threats to members have always been brought under control. The UN is still faced with challenges for which it is still seeking remedies and HIV/AIDS remains a threat facing members in the third world (global south). For the smooth running of the organisation, related sub-organisations and agencies are being created to address challenges facing the members. Organisations such as the World Health Organisation (WHO), United Nations Development Programme (UNDP), Joint United Nations Programme on HIV/AIDS (UNAIDS), United Nations Children's Fund (UNICEF), United Nations Educational, Scientific and Cultural Organisation (UNESCO) and the World Bank are all working to combat the HIV/AIDS epidemic.

According to UN aims, all the organisations are interrelated in terms of sponsorship towards a common goal. NACA (2010) reaffirmed the activities of the United Nations organisations in addressing HIV/AIDS epidemiology in Nigeria through UNAIDS supported by WHO, UNICEF and the World Bank. Lagos State benefits from the United Nations programs in the area of health, education and

environmental issues (Lagos State Government, 2010). United Nations AIDS (UNAIDS) has been in the forefront in tackling the growing HIV prevalence in Nigeria through education and awareness (NACA, 2010). According to the NACA, UNAIDS encouraged more organisations to work on HIV/AIDS in Nigeria. UNAIDS often meets with the management of banks and other stakeholders such as regional NGOs to address the issue of HIV epidemic. They include faith-based organisations (FBOs) and community-based organisations. The HIV epidemic growth has always been a concern for the Lagos State Government and the state encourages everyone to become involved in getting HIV/AIDS under control.

2.2 Electronic health (e-health)

Science and technological advancement has made life easier in the developed world (Marusic and Marusic, 1999). Telecommunication technologies are used in the healthcare industry to increase the efficacy of the biomedical staff and to positively alter life expectancy. According to Adewale (2004) telecommunication technologies is enhancing the delivery of healthcare to patients and also facilitates information management between biomedical staff.

The use of Information and Communication Technologies (ICTs) in healthcare has improved diagnosis, treatment, awareness, education, prevention and research. Berg *et al*. (2003) described the effectiveness of ICTs (medical informatics) and solving real-time problems. Ammenwerth *et al*. (2004) reaffirmed the improved quality and standards that ICTs have brought to health care in monitoring and facilitating communication among biomedical professionals and patients. ICTs have also boosted social activities and provided improved databases for the health sectors.

2.2.1 Healthcare information and database system

Hospital records have always been regarded as the nervous system in the health care sector. Haux *et al*. (2004) stated that, two key factors involved in the medical informatics are: storage and processing. In an ideal hi-tech healthcare system, the biomedical information system should be able to communicate with the remote workstation, transmitting, processing, storing and presenting information. According to Eysenbach (2000), the use of the internet in healthcare will bring advantages to the sector in terms of efficiency and solving real time problems. The quality of hospital information systems have great impact in the life expectancy by reduced consultancy time and improved information sharing in the real-time as adopted in the developed nations.

Haux *et al.* (2004) claimed that the integration of information and communication technologies in healthcare have changed the sectors, reduced the cost and improved the quality of information output. Synchronisations of databases in electronic formats have made e-health easy in the 21st century. Wennberg *et al.* (1987) claimed that information sharing and database update among biomedical staff is the soul of evaluation and monitoring. Databases have always supplied patient information to biomedical staff for perusal and action. In Third World nation's clinical data have not always met such high standards.

2.2.2 Electronic medical record (EMR) system

Electronic healthcare record systems are adopted to increase the availability of information. Hillestad *et al.* (2005) evaluate the potential of electronic healthcare record systems with the use of information technology as efficient in terms of cost

and time. Electronic medical record systems have improved the quality of care given to patients in the developed world. This has drastically reduced biomedical professionals' errors and mortality rates. EMR systems can facilitate patients and biomedical staff consultations. Developing nations are still lagging behind on EMR. Fraser *et al.* (2005) explained the impact of an EMR system, stating some of the benefits to be reduced fears about confidentiality and reduced stress for the biomedical staff.

The sharing of patient data between staff has been made easy with the help of EMR systems, particularly during diagnosis and therapeutic activities. Electronic mail systems are widely adopted in healthcare. Fraser *et al.* (2005) concluded that the use of electronic information systems and EMR systems in healthcare is effective and sustainable. Siika *et al.* (2005), comments on improvements in access made possible by an EMR system designed in Kenya to support HIV-patients. This supports patients and staff in the areas of documentation, drug monitoring, therapeutic activities and provides data for health care and research. According to Fraser *et al.* (2006), inadequate funding and shortage of ICTs staff have been the main problem of EMR operations in the developing nations. Decisions made by policy makers without sufficient consideration is a factor for many African nations. According to Diero *et al.* (2005), constraint of EMRs and personal data assistants (PDAs) in developing countries reduce clinical research, monitoring and evaluations.

2.2.3 Health information management

Health information management has always been the brains behind healthcare delivery. Pratt *et al.* (2006) described the application of personal information

management (PIM) to health care as a useful tool in combating illness in real-time scenario (function of time). This has been proved efficient in cost and time. Figure 2.10 shows examples of patients' information management in broader stakeholders' communities.

Figure 2.10 Fragmentation of patients' information management [Pratt *et al*. (2006)]

Actions by the biomedical staff are expedited in response to the illness or medical issue based on health information availability. Health information management can support diagnosis, prognosis, prediction and clinical trial analysis. Pre-knowledge information through information management has been helpful to the biomedical profession for the diagnosis and prognosis of diseases; typical examples are cancer and HIV/AIDS (Egger *et al*. 2002). Collazos (2003) analysed information

management in the AIDS related case (ARC) to determine the prognostic index and factors. The use of Health Information Management involves consideration of factors such as its effectiveness: connectivity (web and intranet) and privacy. Privacy is not a serious issue in the third world like Nigeria due to the percentage of legal illiteracy.

2.2.4 Connectivity technology in healthcare

Data management and information sharing has been made easy through connectivity technologies such as point-to-point and wireless. Point-to-point (PTP) connection is a technology widely adopted in the intranet system, such as information sharing between a pathology department and an out-patients department in the same hospital. The brain behind an active PTP technology is called the Local Area Network (LAN). Figure 2.11 shows a Typical local area network - LAN.

Figure 2.11 Typical LAN (Cisco, 2010)

Wireless connection technologies are super-integrated technologies, depending on the purpose of the installation. According to the Cisco technology (2010), there are different types of wireless technology, as shown in Table 2.3.

WAN	WAN and WLAN
Licensed	Unlicensed
Digital	Analogue
Line-of-site	Non-line-of-site
Simplex	Half-/full-Duplex
Point-to-point	Multipoint

Table 2.3 Wireless technologies

Information sharing in wider areas has been supportive to the information management in the health care and to the efficacy of biomedical activities. The possibility of data sharing and information retrieval has been easy with internet connections between hospitals, communities and countries. A typical application of ICTs in healthcare is shown below in Figure 2.12.

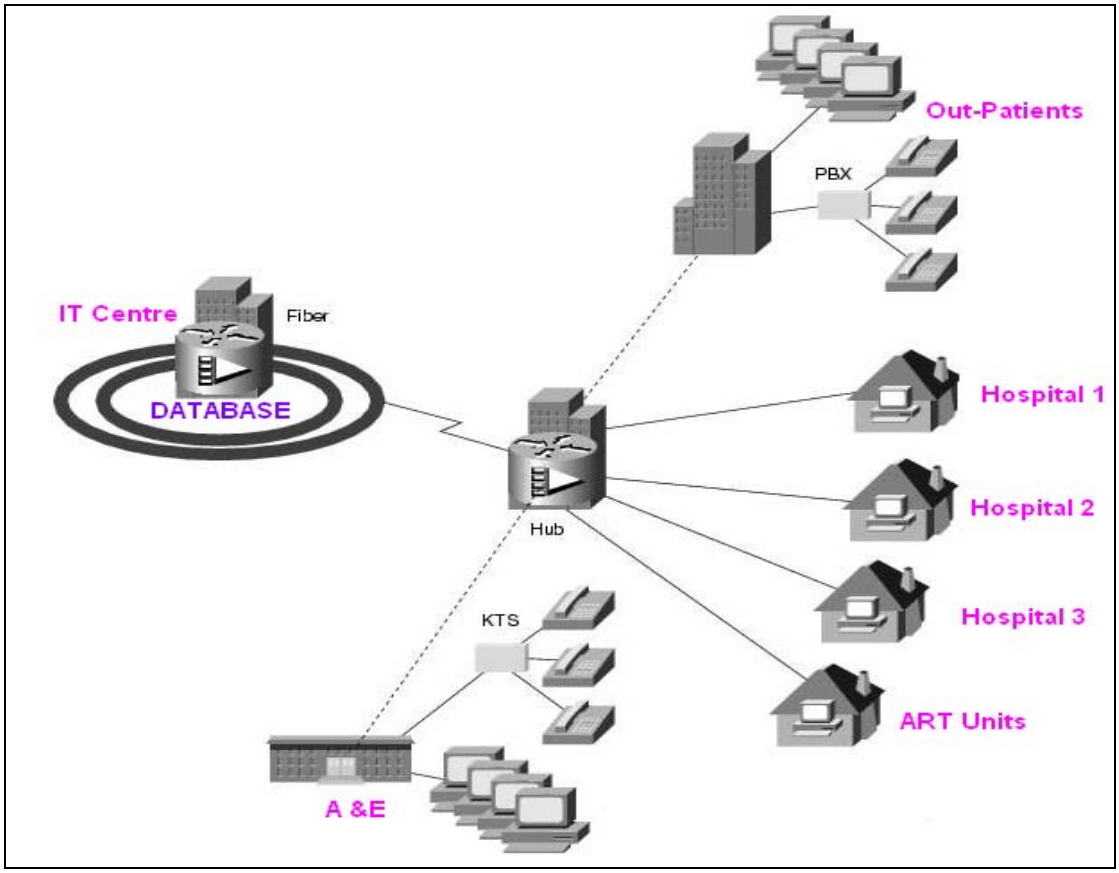
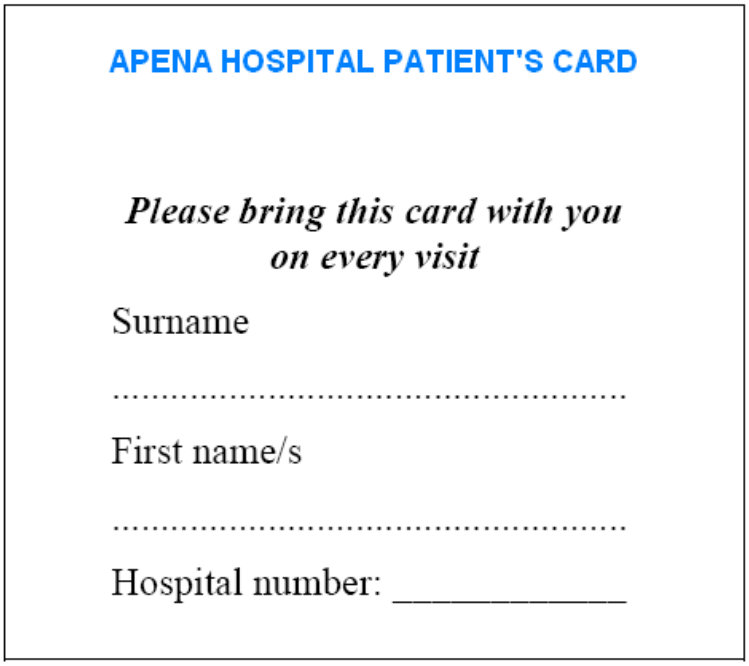


Figure 2.12 Application of wireless access

The diagram shows the application of information technology (IT) in healthcare information management. Berg (2004) confirmed the positive value of integrating IT into health records. The IT standardisation depends on management decisions and the approach they take to address prevailing issue(s). Communications technological advancement and competent staff are still factors that affect the application of wireless technologies in healthcare in the developing nations. ICTs application has been used for monitoring, evaluation and therapeutic measures in the developed world.

2.2.5 Electronic health portal

The electronic health portal is the interface between biomedical staff, patients and information technology. Implementation of ICTs in the healthcare record system has provided staff the opportunity to access and update data simultaneously from different workstations. Medical informatics communities are working to meet the requirements of patient's to be able to input data quickly and easily. Patient records can be accessed via an intranet or web. Kittler *et al*. (2004) commented that the introduction of a web-based electronic health portal in the primary healthcare system is a new phase of technology in the biomedical system that will improve staff-patients relationships. An electronic health portal takes care of the administrative activities in the healthcare information's application.


APENA HOSPITAL PATIENT'S CARD

Please bring this card with you on every visit

Surname

.....

First name/s

.....

Hospital number: _____

Figure 2.13 Example of hospital patient's card

The electronic health portal (EHP) has completely replaced bulky health records in some developed nations. Figure 2.13 shows a typical example of hospital card no

longer required in developed countries. It is no longer necessary to use a patient's card to trace their record and the medical admission process has now transformed by the use of EHP. Electronic questionnaires are now used an example of such a questionnaire can be seen in Figure 2.14.

FIRST ADMISSION			
Date admitted	Provisional diagnosis		Physician
Principal final diagnosis		Secondary final diagnoses	
Discharged (date)	Died (date)	Length of stay	Coded by
NEXT ADMISSION			
Date admitted	Provisional diagnosis		Physician
Principal final diagnosis		Secondary final diagnoses	
Discharged (date)	Died (date)	Length of stay	Coded by
NEXT ADMISSION			
Date admitted	Provisional diagnosis		Physician
Principal final diagnosis		Secondary final diagnoses	
Discharged (date)	Died (date)	Length of stay)	Coded by

Figure 2.14 Example of electronic admission form window

Schabetsberger *et al*. (2006) described the transformation process of a paper-based record system to an electronic form as ever-ready data stand-alone electronic document communication. It has been helpful for both patients and biomedical

professionals. Patient records are always ready for biomedical professionals at the PC interface. This innovation has improved the quality of epidemic monitoring.

2.2.6 Telemedicine

Mair and Whitten (2000) defined telemedicine as "the use of telecommunication technologies to provide information and services". Telemedicine has improved education and awareness in the area of public health in the developed world. Communication technologies include generations of modulation and demodulation techniques aided with information transfer devices such as mobile phones, televisions, telephones and computers. Currel *et al*. (2010) compared the use of telemedicine for public health services to face-to-face work concluding that it is an absolute technological achievement and cost efficient. The application of telemedicine includes transmitting test results through telephone lines and updating appointments with biomedical professionals.

Telemedicine is feasible in the public health system as an effective means of contacting patients and communities. In developed nations, telemedicine maintains relationships between biomedical staff and communities. Bashshur (1995) defined telemedicine as an integration of telecommunication and computer technologies in place of face-to-face contact between biomedical staff and their patients. The interrelationship between telemedicine and health information management is to address issues based on the acquired knowledge and information system.

A typical example is the (pandemic) outbreak of flu in the United Kingdom in 2009. The NHS (2009) provided treatment, advice, and e-prescription over the television,

phones and public liquid crystal display (LCD) board, for the purpose of reducing infection. Patients were given attention over the phone based on the database information management system. Health education was delivered through telemedicine to take the United Kingdom out of the flu epidemic. The efficacy of the process was due to the UK technological advancement in Medicine and Information technology.

This can be contrasted with the situation in developing nations. Fraser and McGrath (2000), analysed information technology and telemedicine in the developing world and described it as a slow process, due to the limits of technological advancement, shortage of biomedical professionals and transportation problems. Telemedicine is far from effective in most of the rural areas in Africa due to the state of their telecommunication and information management systems. Telemedicine in Nigeria is still limited by poor information management system. According to Idowu *et al*. (2003), the application of information management is absent in the Nigerian health sector. Their analysis shows that 98 per cent of biomedical staff in Nigerian teaching hospitals uses private internet facilities. This shows that little training is required to bridge the gap; if Nigerian hospital policies favour full implementation of telemedicine. Keating *et al*. (2006) evaluated the effectiveness of the media system on HIV awareness and prevention in Nigeria. Their results show that 59 per cent of the population responded to the radio while 24 per cent responded to television programs. This is an appreciable response if Nigeria can adopt the use of telemedicine in support of the existing service.

2.2.7 Mobile pharmacy

The use of a mobile pharmacy is beyond the Nigerian programme of vaccination and educational regarding polio. There needs to be effective application of ICTs technologies in the pharmacy service to meet the needs of patients. In the developed nations, efficacy of a mobile pharmacy is high in comparison many developing African nations. This is due to the availability of factors such as skilled biomedical staff, good internet access, e-pay facilities, good communication systems and roads. Fischer *et al*. (2003) stated that the new innovation in medicine is in the area of e-prescription. This is likely to be effective as long as patients report their symptoms accurately. According to Harnick (2009) a mobile pharmacy requires internet access and knowledge of information management in the communities. Availability of access to technologies is likely to increase the opportunities for people in the developing nations to access such facilities.

2.3 Electronic health in Nigeria healthcare system

Nigeria is a developing nation that still lags behind in terms of technological advancement in the health sectors. Activities of biomedical professionals in the public health sector raised question due to the inadequacy of communication means and poor connectivity. Recently, some private hospitals have partially introduced e-health as a way of providing quality health services to their patients. Mobile pharmacies exist in some cities like Lagos, Abuja and Port Harcourt for disaster management, but there are fewer in the suburbs due to transportation and ICT factors.

Current development in telecommunication and internet technologies will hopefully contribute to implementation of e-health systems in Nigeria. This is likely to improve quality of healthcare and increase life expectancy. Full implementation of telemedicine in Nigeria could promote equality in the availability of quality healthcare. Mobile pharmacies will give opportunities to older people to have access to good healthcare (Adewale, 2004). The factors affecting full implementations of e-health are stated below:

- Poor electric power system
- Low level of computer literacy among the patients and biomedical professionals
- Low connectivity (internet, television and mobile)
- Government response and less funding
- Poor education among the patients
- Lack of infrastructure in the healthcare sectors
- Lack of a central medical system.

2.4 Knowledge Management (KM) approach

The application of Knowledge Management (KM) techniques could enhance the current phase of HIV/AIDS activities and synchronise the disjointed knowledge so that there could be a more co-ordinated approach towards tackling the HIV/AIDS epidemic. Private and public hospitals are currently working in isolation and there are over four hundred NGOs working on HIV/AIDS initiatives under the LSACA (Lagos State) network (see Chapter four). HIV/AIDS capacity leaders do not have access to the current incidence rate and STIs transmission rate in the rural areas. HIV/AIDS information, education and communication on risk factors are yet to be addressed in Nigerian rural communities. Bali *et. al.* (2005) stated that KM support

application to enable smooth data integration, document and content management in technological domain.

A technological approach could be used to provide HIV education to sex workers and educate people about high bride price and polygamy. There is currently no technological approach to address the state of HIV awareness, monitoring, evaluation and widen the scope/range of operations. Bali *et al,* (2011) described KM as an organisational knowledge with meaningful interaction of people, processes, activities and technologies that enable the sharing, creation and communication of knowledge. Such techniques can improve the effectiveness of complex networks such as the organisations that are dealing with HIV/AIDS in Nigeria.

The application of E-Health initiatives in HIV/AIDS projects in Nigeria could address challenging issues on HIV transmission and stigmatisation in taking other militating factors into consideration (including socio-economic, cultural and religious factors). Healthcare knowledge transfer technologies such telecommunication and information technology (Eardley and Czerwinski, 2007) could improve the HIV/AIDS healthcare information management system proposed in Figure 2.15.

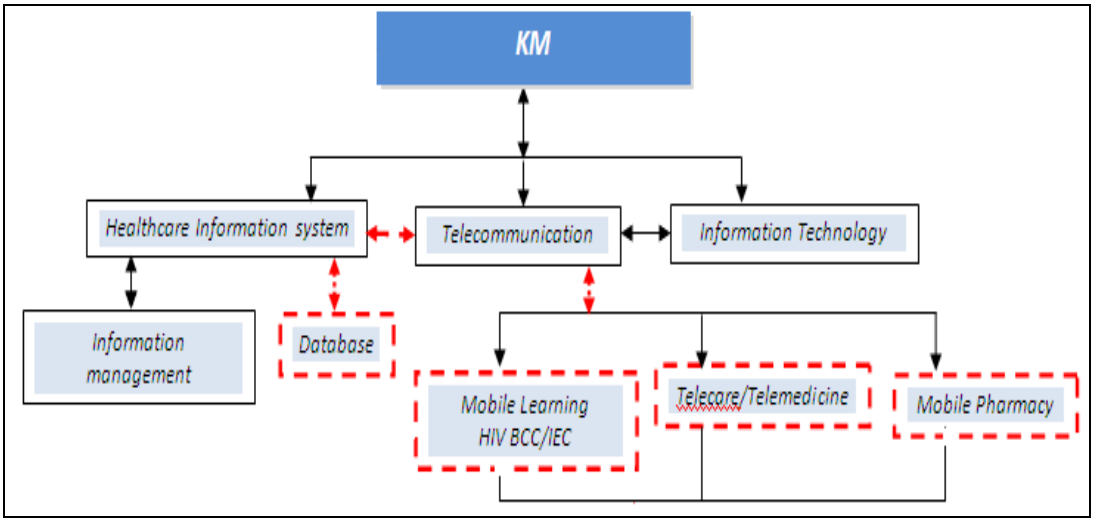


Figure 2.15 Knowledge transfer initiatives

Telecommunication can enhance the flow of information and address fears about HIV/AIDS stigmatisation, assist in tackling behavioural information, education and communication (IEC) challenges. It could increase HIV awareness initiatives and addresses issues such as empirical research and cultural-religious myths. Information technologies can help healthcare service providers, capacity leaders and biomedical staff who are working in isolation, and synchronize hospitals (private and public) activities toward common goals. The introduction of a database system to Nigeria healthcare could assist with monitoring of STIs and HIV/AIDS including monitoring the number of AIDS related cases (ARC) and the mortality rate.

Knowledge Management (KM) has been described as organizational knowledge with meaningful interaction of people, processes, activities and technologies that enable the sharing, creation and communication of knowledge (Bali et al, 2011). Apena *et al,* (2010) showed that correct application of KM tools and techniques could enhance current HIV/AIDS activities and synchronise disjointed knowledge leading to a more coordinated approach towards tackling the HIV/AIDS epidemic. Such KM

techniques could help improve the effectiveness of complex networks such as the organizations that are dealing with HIV/AIDS in Nigeria. The benefits of KM to HIV/AIDS organizations in Lagos could span improved information sharing, greater teamwork, better preparedness, reduced duplication of efforts and increased levels of coordination.

2.5 Summary

This chapter provides a review of HIV/AIDS transmission and prevention at both national and global levels, and reveals the complexities inherent in understanding HIV/AIDS risk factors (including a myriad of factors such as STI/STDs, stigmatisation, use of condoms and therapeutic activities). Religion and cultural practices in particular have undermined HIV/AIDS awareness activities around the world. In Nigeria, students, youths and teenagers aged 15-24 appear more vulnerable due to the lack of decision and knowledge on HIV/AIDS transmission. Students' sexual activities link communities to communities and this directly contributes to the high prevalence rate. The study guide (Figure 3.3 Research Methodology) focuses on Lagos State students as a potential risk group in the metropolis to evaluate transmission and prevention risk factors using HIV/AIDS quality indicators as stated in Chapter 3 (Section 3.5.1).

The review also touched on contemporary healthcare delivery systems such as telemedicine and mobile pharmacies and considered such avenues of health delivery as promising initiatives for the current public health system. Information technology and telecommunication were discussed as aggregate tools for the Knowledge Management (KM) paradigm. This appears to be a promising solution to HIV/AIDS

organisational issues in Lagos State (Chapter 7, Section 7.5) and synchronisation of currently disjointed knowledge can move stakeholders to a common goal of addressing the high prevalence rate. This thesis will propose a validated KM-centric framework to address HIV/AIDS risk factors.

3 Research methodology

Section 3.1 introduces the research strategy and the applied concept of Knowledge Management (KM). Section 3.2 describe potential HIV/AIDS risk groups in Lagos State. Section 3.3 explains how the application of this methodology can be used successfully. Section 3.4 presents Lagos State Local Government areas (LGAs) in their divisional grouping. Sections 3.5 and 3.6 describe the approaches to data mining and analysis respectively. Section 3.7 concludes with a summary.

3.1 Research strategy

This chapter describes in detail the research approach taken in this research project. Successful research requires good research strategy and tactics. Strategy is defined as good planning towards the scope of the research, while tactics provides a detailed process for data collection and analysis (Saunders *et al*. 2003). Good research should develop knowledge, ideas and innovation within the research framework or model.

This thesis will develop a framework for HIV/AIDS activities in Lagos State in order to enhance the Lagos State AIDS Control Agency (LSACA) education, monitoring and evaluation process. The focus of this study is to identify how an e-health system (non-clinical) can be integrated into the existing HIV/AIDS education and awareness with respect to the HIV/AIDS epidemic in the Rural and Urban areas of Lagos State, Nigeria. It aims to explore the inter-relationship between information communication technologies (ICTs), healthcare systems (process) and the response of people from Lagos State to HIV/AIDS. The current research used Knowledge Management perspectives (as shown in Figure 3.1).

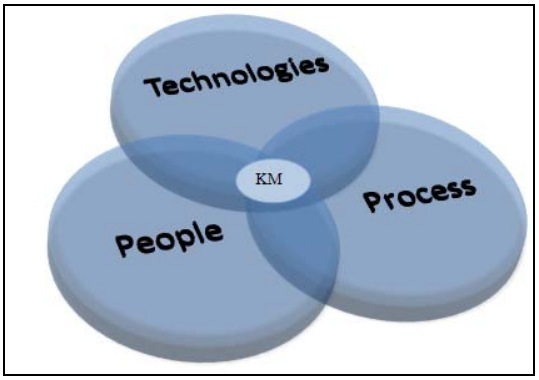
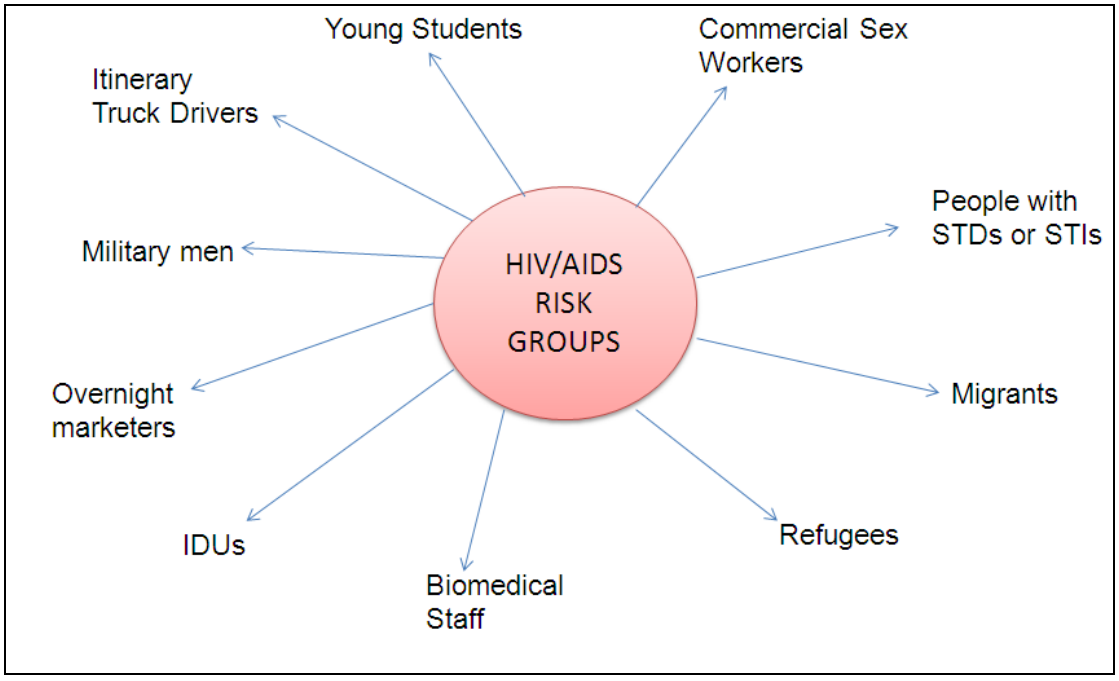


Figure 3.1 KM core component

3.2 Potential risk groups in Lagos State

The research strategy required survey mapping skills for data mining and analysis. The entire risk group (highlighted in section 2.1.2 of the Literature Review) are active in Lagos State apart from intravenous drug users (IDUs). According to Olawoye *et al*. (2007) IDUs are regarded as extremely low factor in the HIV/AIDS transmission in Nigeria. Identified potential risk groups are represented as shown:



This study considered all the potential risk groups listed above for the development of a suitable framework as described by LSACA data (via interview). The qualitative aspect of this current research (state of HIV education and awareness) will focus on the semi-structured interview with the Lagos State AIDS Control Agency - LSACA. The questionnaire (quantitative aspect) addresses the extent of HIV/AIDS awareness, education, stigmatisation and strength of the HIV/AIDS Counselling and Testing Centres with respect to the current state of HIV/AIDS epidemic awareness among young day students in the Lagos State Schools (formal environment). This research evaluates the extents and strength of HIV/AIDS education and awareness through selected HIV indicators, such as risk factors and behavioural issues in a statistical context, for all the twenty Local Government Areas (LGAs) of Lagos state of Nigeria (Lagos State Divisions).

3.3 Triangulation methodology

Triangulation method is viewed as a powerful strategy to ensure the success and credibility of the work done. It requires a combination of multiple methods, sources of data, researchers' perspectives, views and interpretations (Carpenter and Suto 2008). In summary, triangulation adopts both quantitative and qualitative research methods to strengthen the research. Figure 3.2 presents a clearer picture of triangulation research methodology.

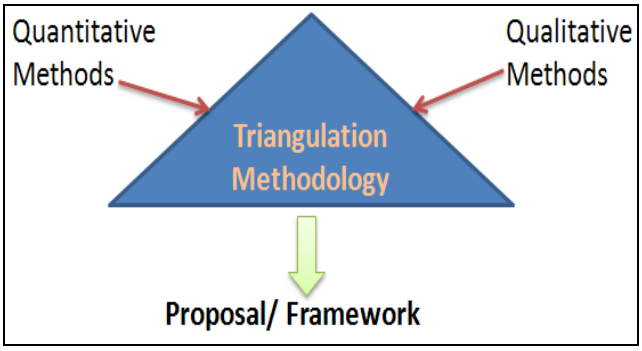


Figure 3.2 Concept of triangulation methodology

As shown in the Literature Review (Chapter 2), this study calls for an integration of technological innovations into the Lagos State healthcare system. In essence, an e-health system (non-clinical) will be integrated into the framework to enhance HIV/AIDS awareness and education in Lagos State Schools. This current research relies on quantitative data mined from Lagos State Schools, (namely, a questionnaire distributed to students in a potential risk group and data mined from a LSACA semi-structured interview). The study required informal discussions with focus groups, participant observation groups and community-based organisations. In the strategic planning of this research, Lagos State is viewed in smaller divisions according to local governments (Lagos State division). Local governments are grouped into state divisions in the respective LGAs and LSACAs operation.

3.3.1 Qualitative and quantitative aspects of this research

Adoption of qualitative and quantitative methods in this research has produced a research study guide as shown in the diagram below (Figure 3.3). Carpenter and Suto (2008) defined qualitative research as an historical association of anthropology, sociology, psychology and education. They further described qualitative research as

an umbrella term for concept, assumption and complexity viewed as an inter-related family of research.

This research targets young students and people living with HIV/AIDS (PLWHA). The qualitative aspect of this research revealed the official state of HIV/AIDS awareness and education in Lagos State and was achieved by semi-structured interviews with a policy maker (LSACA) involved with HIV/AIDS activities in Lagos state. The evaluation of e-health in the Lagos State health-care system was also achieved through an informal discussion with the staff of the Lagos State Ministry of Health. Figure 3.3 below shows the study guide used for this current work.

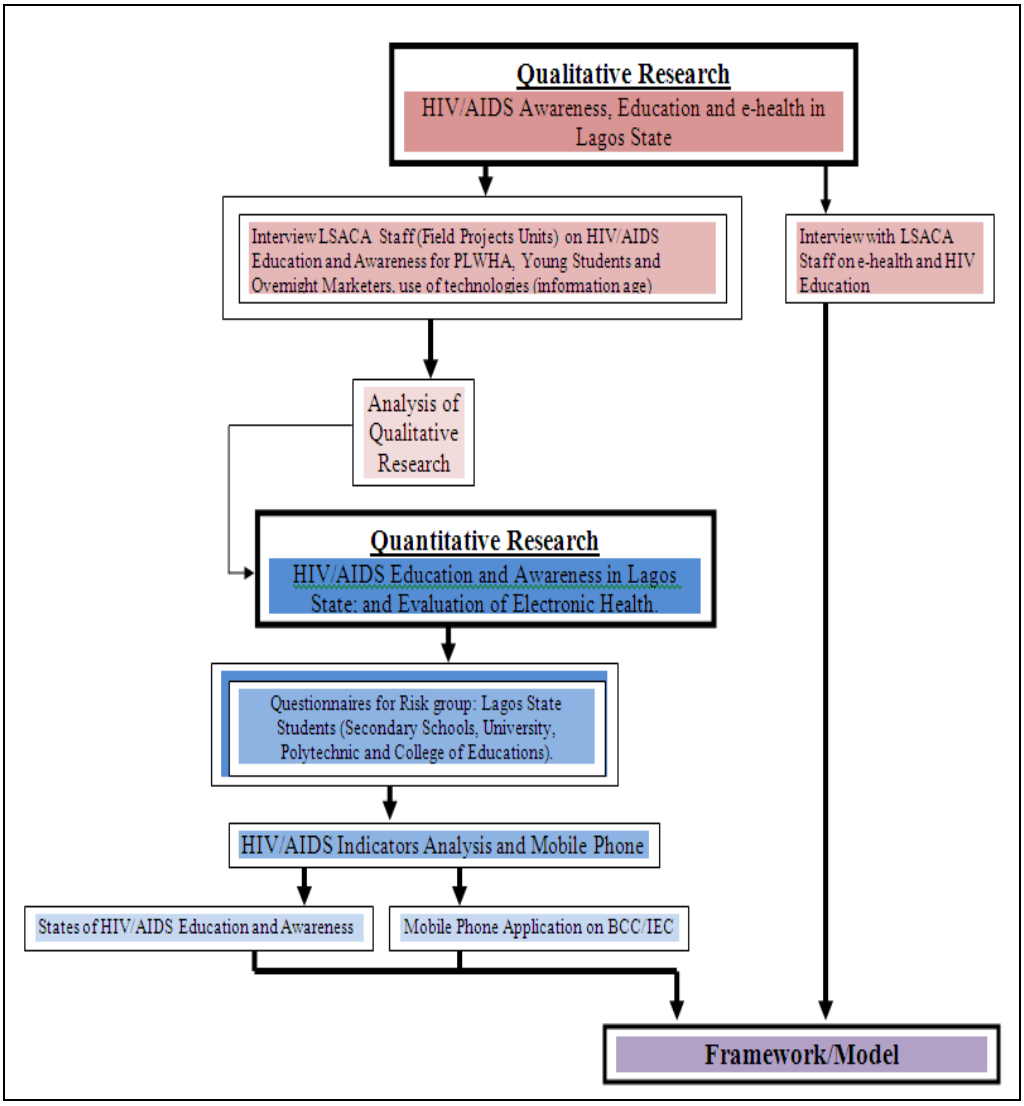


Figure 3.3 Research methodology

According to Carpenter and Suto (2008) qualitative quantitative methodologies can be combined as a mixed method of approach (Triangulation methodology) in order to improve the outcome. Carpenter and Suto described quantitative studies as a way to determine cause and effect relations within the scope and field of the research. For this current research, Figure 3.2 above gives a comprehensive schematic view of the research methodology, including data mining and analysis. The quantitative research methodology side of this research focused on working with a particular risk

group to sample and evaluate the state of HIV/AIDS activities in the categories of prevention, transmission and HIV counselling and testing (HCT) in Lagos State, Nigeria. This current research has no ethical implications as all data used made anonymous and will be destroyed at the end of the project. The qualitative aspect of this research focused on the LSACAs' activities (Appendix II (b)) - (i) HIV/AIDS education and awareness and, (ii) evaluation of telemedicine.

The pilot test of the questionnaire in the Alimosho Local Government area (most populated LGA) of Lagos State showed that the questionnaire (Appendix II (a)) was generally suitable and highlighted possible problems that might occur during the study. The questionnaire was designed to give a comprehensive response rate and reliability on HIV/AIDS indicators used in evaluating HIV/AIDS education and awareness. Furthermore, it was designed in a sequential manner, using both open and closed questions. The questionnaires targeted understanding of students towards HIV/AIDS transmission and prevention. It also considered their level of education and sexual activities. The questionnaire is not only used for data collection, but also to view the opinion, behaviour and attitudes of the participants towards HIV/AIDS initiatives.

3.4 Rural areas and urban centres of Lagos State

In order to aid the research the twenty local governments of Lagos State of Nigeria are grouped into rural areas and urban centres, based on the population, commercial activities, availability of social amenities, including the nature of the vegetation. Table 2.5 (Chapter 2) shows the population concentration on all the local governments of Lagos State, according to the Lagos State Government (2007) census.

Factors such as industrialisation and proximity to social amenities determine the population distribution and concentration in some Lagos States. Factors such as livelihood and economic variables contribute to mobility and migration within the five divisions of Lagos state and these are established factors that contribute to HIV/AIDS incidence and prevalence.

The migration of young students from rural areas to the urban centres is a strategy used for the purpose of seeking better life, with the aim of escaping from work such as farming or lumbering. Table 3.1 shows the twenty Lagos State local governments in rural areas and urban centres. Taking an holistic view, the research evaluates HIV/AIDS education in all five divisions of Lagos State, through the study of students (risk group) and the activities of the Lagos State AIDS Control Agency (LSACA), including the NGOs.

Rural areas	Urban Centres
Badagry LGA	Ajeromi-ifelodun LGA Ojo LGA Amuwo Odofin LGA
Epe LGA Ibeju-Lekki LGA	
	Agege LGA Alimosho LGA Ifako-Ijaye LGA Ikeja LGA Mushin LGA Oshodi-Isolo LGA
Ikorodu LGA	Koshofe LGA Somolu LGA
	Apapa LGA Lagos Island LGA Eti-osa LGA Lagos Mainland LGA Surulere LGA

Table 3.1 Lagos State into rural areas and urban centres

3.5 Data analysis

According to Saunders *et al*. (2003), in order to carry out successful research, the following factors should be considered before adoption of any analytical methods: (i) types of data, (ii) format in which the data will be input to the analysis software, (iii) the need to weight cases, (iv) methods intended to be used for data cleaning (test) and validation. During the pilot stage of this current research it was concluded that data analysis would take place in sequential order as taken from the questionnaire (quantitative data – Appendix II (a)). The qualitative aspect of this research (semi-structured interview – Appendix II (b)) will be considered during the analysis where necessary.

The quantitative aspect of this analysis gave an insight into HIV transmission, prevention and behavioural challenges in terms of HIV/AIDS education and awareness in Lagos State. This was done using questionnaires given to the selected risk group (students). Both methods used prevention and transmission indicators as indices of HIV/AIDS education in the Lagos State of Nigeria. Based on the qualitative analysis, this thesis will produce a Roadmap to assist the introduction of Electronic Health into the healthcare system in the Lagos State of Nigeria. The aim of the Roadmap would be positively to increase HIV awareness and improve life expectancy in Lagos State.

3.5.1 Indicators for HIV/AIDS projects

In HIV/AIDS descriptive analysis, there are specified indicators used to determine the quantifiable inequalities. For this research, the indicators (variables) are represented in categories as shown in Table 3.2. The table shows different categories of HIV projects and the indicators that they used in HIV/AIDS research and global

communities. Specific indicators are used in this research to measure LSACA goals in the area of HIV/AIDS education and awareness. HIV/AIDS prevention programs evaluate the extent of education, while HIV/AIDS prevalence (both clinical and non-clinical) establishes the validity of awareness in the respective domain or community.

Categories	Indicators
Prevention: IEC/BCC/BCI	Number of IEC material developed Number of IEC material disseminated Number of IEC events conducted Number of people reached
Prevention	Number of condom distributed Number of people served Number of service provider trained Number of people referred for STIs diagnosis and treatment
Volunteer Counselling Therapy (VCT) and HIV Counselling Test Centre	Number of councillors trained Number of clients seen at VCT centres Number of new VCT sites established Number of VCT centres
Pregnant Mothers Transmission Counselling Therapy (PMTCT)	Number of women who attended PMTCT sites for a new pregnancy. Number of infants receiving drugs Number of service providers trained
Policy Development	Number of capacity building training sessions Number of people trained Number of advocacy activities implemented Number of policies developed and revised on education and awareness Number of networks and NGOs formed Number of NGOs working on HIV/AIDS education and awareness Number of people reached
Human capacity Building	Number of training session conducted Number of people trained

Table 3.2 Categories and indicators for HIV/AIDS education project

This research revealed the effectiveness of non-governmental organisations (NGOs) working on HIV initiatives and of HIV Counselling and Testing (HCT) centres in the domain of the survey in Lagos State. It also revealed the extent of HIV/AIDS transmission and prevention awareness among the selected risk group (Lagos State students) with respect to other potential risk groups such as overnight marketers and people living with HIV/AIDS (PLWHA).

Furthermore, the distribution strength of the capacity builders of the HIV/AIDS NGOs network in the Lagos State metropolis (five divisions of Lagos State) will be revealed by the respondents. The indicators above (shown in Table 3.2) were used to design questionnaires for both qualitative and quantitative data mining to derive inequalities variable appropriate to this research. This includes Lagos State structural and human capability on HIV/AIDS activities and prevalence in the metropolis, including the rural areas viewed in (Chapter 4) Case study: Lagos State AIDS Control Agency (LSACA) in a broad context.

3.6 Research survey and analysis requirement

This research observed all ethical protocols as set out by the Lagos State Government. The Head of the Lagos State AIDS Control Agency (LSACA) approved and consented to give a taped semi-structured interview with the project units of the establishment in order to produce qualitative data (Appendix II (b)) for this research. The interview was conducted with the LSACA Project Team (monitoring and evaluation – M & E) as this is recognised apex body on prevention and transmission of HIV/AIDS (non-clinical) in the Lagos State of Nigeria.

According to Saunders *et. al.* (2003), participant observation of M & E has its roots in social anthropology and related activities. The Project Team are recognised as potential participants on HIV/AIDS activities in Lagos State. The Lagos State Ministry of Education consented and approved Lagos State Schools (Students) as the selected risk group in this research and the data was mined anonymously (Appendix II (a)). The research team agreed to use 1000 questionnaires, in other to strengthen the analysis. The survey achieved a 95.8% response rate.

Divisions	Frequency	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Badagry	164	17.1	17.1	17.1
Epe	157	16.4	16.4	33.5
Ikeja	374	39.0	39.0	72.5
Ikorodu	107	11.2	11.2	83.7
Lagos Island	136	14.2	14.2	97.9
Non Lagos State	20	2.1	2.1	100.0
Total	**958**	**100.0**	**100.0**	

Table 3.3 Respondents survey in Lagos State divisions

The survey was carried out in the five divisions of Lagos State (secondary schools students) for a lower age range, while Lagos State University were used for the upper age range as shown in the Appendix III (respondents' age groups). The breakdown of the survey respondents (958 Students) are shown in Table 3.3. Badagry, Epe and Ikorodu Local Government areas (LGAs) represent the rural areas in the survey with respective respondents 164 (17.1%), 157 (16.4%), 107 (11.2%). Ikeja and Lagos Island divisions represent the Lagos State urban metropolis, with respective responses of 374 (39%) and 136 (14.2%).

Ikeja division have the highest number of secondary schools over other Lagos State divisions, due to the population distributions and proximity to social amenities including the Lagos State administrative site located in Alausa-Ikeja (Lagos State Government bulletin, 2011). The Lagos State University Faculty of Law, Science, Education, Art and Humanities are situated in Ikeja division (Ojo Local Government) including the Lagos State University part-time centres in Agege, Ikeja and Oshodi-Isolo LGAs. The Lagos Islands division is a urban centres for commercial activities and a diplomatic site for foreign nationals. The surveys capture some students 20 (2.1%) that are not residents of Lagos State. These are potential risk group of HIV transmission from other states of the Federation (Nigeria).

This current research explores uses of a statistical package (Statistical Package for the Social Science - SPSS®17 and the integration of information and communication technology knowledge to develop an electronic healthcare initiative (Knowledge Management based) framework. SPSS®17 is user- friendly statistical package of programs for data presentation, transformation, analysis and manipulation (Landau and Everitt, 2004). It is a useful package for sociology and behavioural studies; with advantages over windows Excel compatibility as it has a drop-down menu and explicit help. According to Pallant (2010), SPSS®17 is a suitable package as it includes a descriptive analysis output and the provision of step-step procedures.

3.7 Summary

The chapter discussed the KM paradigm and established HIV/AIDS potential risk groups in the research domain. Lagos State is categorised as a metropolis with rural

and urban characteristics; these attributes influence the rate of HIV transmission and have undermined various attempts at prevention. Triangulation was introduced as a powerful research strategy. Qualitative data guides the study and strengthens the direction of the fieldwork. Quantitative data revealed the extent of HIV/AIDS risk factors allowing for respondents' behavioural issues to be evaluated.

4 Case study: HIV/AIDS in Lagos State

Sections 4.1 to 4.4 of this chapter outline Lagos State's socio-political settings. The Lagos State public healthcare delivery system and Lagos State AIDS Control Agency (LSACA) shall be described in Sections 4.5 to 4.7. Lagos State HIV/AIDS epidemiology, with respect to national prevalence, will be detailed in Section 4.8. Section 4.9 highlights challenges facing LSACA and presents the Strategic Plan for 2010-2015. Section 4.10 concludes with a brief summary.

4.1 Lagos State

Lagos State is located in south-west Nigeria and was created 1967 by the military government which restructured the Nigerian Federation to twelve states in same year. It shares boundaries with the Republic of Benin in the West; Ogun state in both the North and East, while in the South of Lagos State lies the Atlantic Ocean stretching for 180 kilometres along the coast. It is the smallest state as shown on the map of Nigeria (Figure 2.10) with an area of 3,577 km², including the Lagoons and creeks. Lagos State is divided into five divisions, Badagry, Epe, Ikeja, Ikorodu, and Lagos Island.

Prior to the creation of the State, Lagos municipality consisted of Lagos City and Lagos mainland (Yaba, Ebutte-meta, Surulere). The mainland was controlled and administered by the Federal Government through the Federal Ministry of Lagos Affairs (as a regional authority). Lagos City (Lagos Island area and Victoria Island) was governed by Lagos City Council (LCC). The four divisions (Badagry, Epe, Ikeja,

Ikorodu) added to the LCC (Lagos Island) comprised the former colonial province governed and administered by the Western Region Government.

The capital of Lagos State is Ikeja, where the seat of Government (state secretariat – Alausa Ikeja) is located. The provision for the structure of Government in Lagos State as stated in the Federal Republic of Nigeria constitution are an Executive, Legislative and Judiciary. All the arms of government are interrelated in accordance with the constitution. According to the Lagos State Ministry of Information (2010), the State Executive is comprised of all the honourable commissioners and special advisers and headed the Lagos State Governor. Honourable Commissioners are overseers of their respective ministries. The executives are in charge of the administration, finance and security of the state.

Lagos State is known for industrial, commercial and investments activities with different types of manufacturing firms. Lagos State harbours 60% of the federation's total industrial investment and 65% of the nation's commercial activities with over 200 financial institutions including the Nigeria Stock Exchange. The headquarters of many multinational companies and all public enterprises are located within Lagos. Lagos State accommodates many more investments and the Lagos State Government providing small scale businesses in all the twenty local governments and thirty-seven development centres to promote industrialisation. Lagos State is also known for tourism. Figure 4.1 shows the geographical view of Lagos State of Nigeria (view location on Map of Nigeria – Figure 1.2).

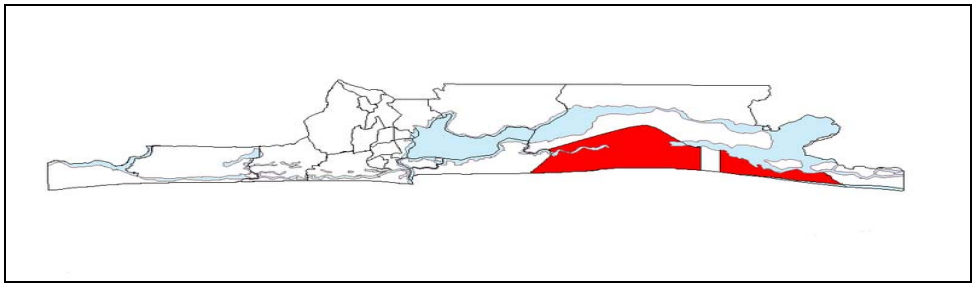


Figure 4.1 Geographical view of Lagos State

< http://haleonicestateagent.blogspot.co.uk/2011/01/buy-affordable-properties-at-ibeju.html> [June 1, 2012]

The Federal Government manages the natural resources like sea ports and coast with the support of the Lagos State government and independent groups or organisations.

4.2 Divisions of Lagos State and Local Government areas

774 local governments were created in all the states of the Federation in order to manage developments and infrastructures for the Federal Government and the state authorities (The nation, 2009). Lagos State is divided into five divisions for the purpose of development providing the traditional rulers with a sense of belonging in the divisions. The twenty local governments below report to the Lagos State Ministry of Local Government Affairs through their various local government chairmen (Lagos State Government, 2010). The Lagos State Government created 37 more development centres to accelerate development at the grassroots.

Badagry division

- Amuwo Odofin Local Government Area
- Ajeromi-Ifelodun LGA
- Badagry LGA (*more of rural settlement*)
- Ojo LGA

Epe divison

- Epe LGA *(more of rural settlement)*
- Ibeju-Lekki LGA

Ikeja division

- Agege LGA
- Alimosho LGA
- Ifako-Ijaiye LGA
- Ikeja LGA (Capital of Lagos State)
- Mushin LGA
- Oshodi-Isolo LGA

Ikorodu division

- Ikorodu LGA
- Koshofe LGA
- Somolu LGA

Lagos division

- Apapa LGA (Sea port)
- Lagos Island LGA (main commercial centre)
- Eti-osa LGA (foreign administrative centre and housing – embassies and headquarters)
- Lagos Mainland LGA
- Surulere LGA

4.3 Formal education in Lagos State

According to the Lagos State Government (2010), the state is known as the "centre of excellence" in educational activities. Lagos State has the highest number of schools

relative to other states in the Federation, providing excellent education for the indigenes and the citizens residing within the state. The Lagos State Government's vision is to *"Provide Free and Qualitative Education to the entire populace of Lagos State"*. Education in the state is monitored and administered by the Lagos State Ministry of Education through the parastatals (government bodies) operating under the ministry. The Ministry is headed by the Honourable Commission for Education, a political appointment by His Excellency (Lagos State Governor). Educational activities in Lagos State are overseen by the Special Adviser on Education as described in the "Assignment of Ministry of Education: Ministerial Responsibilities contained in the *Lagos State Official Gazette No. 7 Vol.34 of 22nd March 2001"* (Lagos State Government of Nigeria).

The Lagos State Government has 1803 Primary schools, 902 Secondary Schools and 5 Technical Colleges. Lagos State tertiary institutions are the, Adeniran Ogunsanya College of Education (Ijanikin-Ojo), Lagos State Polytechnic (Ikorodu and Isolo) and Lagos State University (Ojo and Epe), which includes the Lagos State University Teaching Hospital (LASUTH), Ikeja (Lagos State Ministry of Education, 2010). Primary and secondary schools are located in accordance with population growth in the local government areas and the three tertiary institutions are located in the urban centres. Education in Lagos State has always been supported by the Federal Government through the Federal Ministry of Education via a series of programmes and non-governmental organisations including the World Bank with assisted programmes in various forms.

4.3.1 Informal education parastatals in Lagos State

According to the Lagos State Government (2010), educational parastatals are created for the purpose of administration efficacy and accountability. All of the following parastatals look to the Ministry of Education for finance, directives and policies:

- Lagos State Scholarship Board
- Lagos State College of primary Education
- Lagos State Library Board
- Lagos State University
- Lagos State University Teaching Hospital (LASUTH)
- Lagos State Universal Basic Education Board
- Adeniran Ogunsanya College of Education (For National Certificate on Education - NCE)
- Agency for Mass Education
- Lagos State Examination Board
- Lagos State Teachers Establishment and Pensions Office.

4.4 Lagos State demography population

The Lagos State Government (2007) published the result of a census exercise conducted with the Federal Government's National Population Commission (NPC) in 2006. Table 4.1 shows Lagos State's population in 2006 to be approximately 17.5 million. The State Government claims that "population growth rate is 8% and the rate of population growth is about 600,000 per annum with a population density of about 4,193 persons per sq. km; while in the built-up areas of Metropolitan Lagos State have the average density of over 20,000 persons per square km" (Lagos State

Government, 2010). Table 4.1 shows the population by gender in all of the Lagos State Local Governments in 2006. Socioeconomics and family behavioural factors have been identified as causative factors of Lagos State population growth (Odimegwu, 1999 and Ahmed, 1986).

Local Government	Male	Female	Total
Agege	564,239	468,825	1,033,064
Ajeromi-Ifelodun	723,644	711,651	1,435295
Alimosho	1,099,656	947,370	2,047,026
Amuwo Odofin	301,012	223,959	524,971
Apapa	264,728	257,656	522,384
Badagry	187,427	192993	380,420
Epe	153,360	170,274	323,634
Eti-Osa	460,124	523,391	983,515
Ibeju-Lekki	49,613	49,927	99,540
Ifako-Ijaye	380,112	364,211	744,323
Ikeja	328,778	319,942	648,720
Ikorodu	364,207	324,838	689,045
Kosofe	527,539	407,075	934,614
Lagos-Island	461,830	398,019	859,849
Lagos Mainland	326,433	303,036	629,469
Mushin	684,176	637,341	1,321,517
Ojo	507,693	433,830	941,523
Oshodi-Isolo	514,857	619,691	1,134,548
Somolu	517,210	507,913	1,025,123
Surulere	698,403	575,959	1,274,362
STATE TOTAL	**9,115,041**	**8,437,901**	**17,552,942**

Table 4.1 Lagos State population by sex in 2006

Lagos State Government bulletin [Nov. 2007]

4.5 Healthcare in Lagos State

The health system in Lagos State is overseen by the Lagos State Ministry of Health. The Lagos State Government provides healthcare services through the general hospitals, medical centres and maternities (primary health centres) in both urban and rural areas (Lagos State Ministry of Health, 2010). There are two teaching hospitals in the State: the Lagos State University teaching Hospital (LASUTH – Lagos State University) and the Lagos University Teaching Hospital (LUTH – University of

Lagos). There are many sub-standard private hospitals in the streets of Lagos State, providing services which are not regulated by the Lagos State Ministry of Health. In the last decade, the State Government has increased their budget in the area of public health allowing more modern general hospitals to be constructed and more biomedical practitioners to be employed (Lagos State Government, 2010).

The Lagos State Ministry of Health identifies and promotes diseases preventive health services; the case of HIV/AIDS remains a long-standing issue in the State (Lagos State Ministry of Health, 2010). The services provided by Lagos State Government through the Ministry of Health ranges from rural to urban and Lagos State municipals and include:

- Maternal and Child Healthcare;
- Child Welfare including immunization against vaccine preventable diseases and School Health Centre;
- Health Education and awareness;
- Maintenance of statistical records and control of communicable diseases;
- Environmental Sanitation (in supervisory role over the Local Authority Health Units);
- Family Planning;
- Immunization of adults as part of personal health service (Curative).
- Blindness Prevention Program

- HIV/AIDS antiretroviral therapy.

The two parastatals under the Lagos State Ministry of Health are Lagos State Hospital Managements Board (LASHMB) and Lagos State University Teaching Hospital (LASUTH). One of the main factors militating against healthcare services is that healthcare professionals in Lagos State are working in relative isolation due to the lack of a central health system.

4.6 Background of Lagos State AIDS control agency (LSACA)

Lagos State AIDS Control Agency (LSACA) was created as a state operational agent to tackle HIV/AIDS in accordance with the master plan of the Federal Government of Nigeria (LSACA, 2010). LSACA activities are monitored by the National Agency for the Control of AIDS (NACA) and the Lagos State Ministry of Health through the Lagos State Hospital Management Board (LASHMB). The State provides human resources and infrastructures while NACA provides the operational support and materials.

LSACA supervises all HIV/AIDS activities in the State and mediates with organisations or interest groups working on the goal to control HIV/AIDS. The main function of LSACA is to monitor and evaluate HIV/AIDS activities within the state and to report to NACA. LSACA drives the efficacy of HIV antiretroviral therapy in the State with the help of interest groups and NACA (NACA, 2010). The stakeholders included over 400 non-governmental organisations (NGOs), communities based organisations (CBOs), faith based organisations (FBOs), line ministries, local governments (LACAs) and development partners such as the United Nations Organisation.

The LSACA was given the sole mandate to coordinate and oversee the HIV/AIDS activities within Lagos State with a focus on control and prevention. The memberships are categorised into eight work groups as shown in the case diagram below (Figure 4.2). The LSACA has been active in bridging the gaps within their capacity and addressing a series of challenges in the network using the cooperation of all the stakeholders. The agency's activity includes promoting care and support for people living with HIV/AIDS (PLWHA) and development of Information, education and communication (IEC) materials activity in conjunction with other groups.

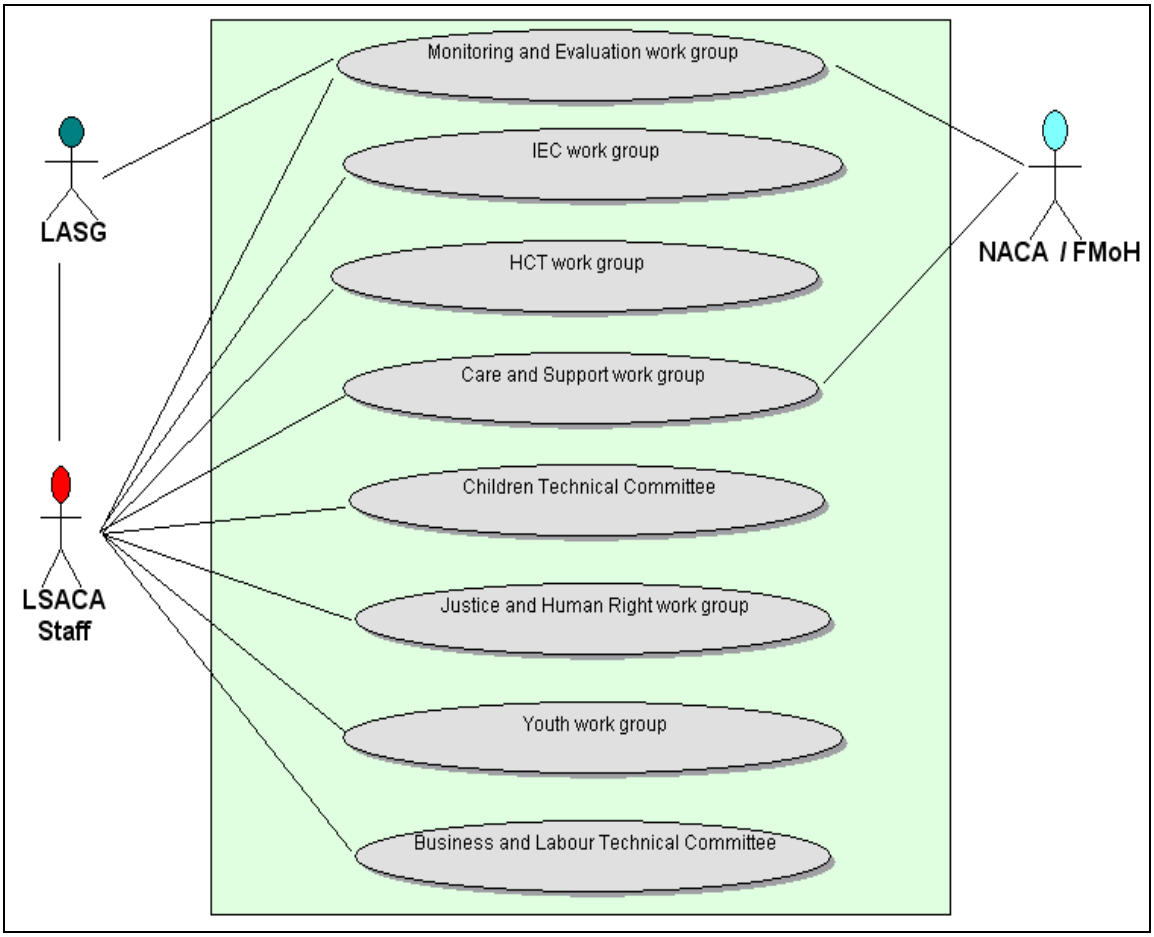


Figure 4.2 Lagos State AIDS control agency memberships

LSACA has implemented a series of HIV/AIDS intervention/behavioural programmes funded by and in partnership with organisations and such as AIDS Prevention Initiative in Nigeria (APIN), the United Nations children's fund (UNICEF), the United Nations developments programme (UNDP), the World Bank and other local organisations.

This study evaluates the efficacy of HIV/AIDS stakeholders through Lagos State students. The focus of the research investigation (detail in Chapter 3) can be summarised as: (i) HIV/AIDS information, education and communication (IEC) activities, (ii) care and Support of PLWHA (fear stigmatisation), (iii) HIV counselling and testing (HCT) and (iv) monitoring and evaluation activities. LSACA sets aims and objectives by dividing the activities into Technical Thematic Working Groups (TWG) to support the National Response Review (NRR) on HIV/AIDS in Nigeria as shown in Table 4.2.

1	Prevention, Behavioural Change
2	Care, Treatment and support
3	Monitoring and Evaluation, Research and Surveillance
4	Socio-economic Impact of HIV/AIDS epidemic
5	Uniform Services and Regional Programmes
6	Policy, Advocacy, Legal Issues and Human Right
7	Coordination, Institutional Arrangements
	Resource Mobilization and Management

Table 4.2 Thematic working groups
(LASCA HIV/AIDS Response Review 2000 - 2005)

4.6.1 Lagos State HIV/AIDS awareness and education

Since the creation of the States AIDS Control Agency in 2000, LSACA has been performing well in the area of basic science medical studies but lacks optimisation of knowledge transformation on HIV/AIDS awareness activities and behavioural challenges. HIV/AIDS education on transmission and prevention remain the prevailing factors of the HIV/AIDS epidemic in Nigeria (Arowojolu *et al.*, 2002 and Adebajo *et al.*, 2003). HIV/AIDS stigmatisation in Lagos and the fear of contagion to medical staff from the people living with HIV/AIDS (PLWHA) is high. The attitudes of healthcare providers to people living with HIV/AIDS, makes people reluctant to be tested for HIV (Oluwagbemiga, 2003).

Risk groups in the urban areas have experience series of HIV initiatives such as taking part in focus groups, but these have been criticised for only involving a few schools in urban areas, making rural areas more vulnerable to HIV/AIDS (Pealman *et al.* 2002). According to Owolabi *et al.* (2005), sexual behaviour among adolescents confirmed that there are knowledge deficits about STIs and HIV in this at risk age group. Youthful exuberance among Lagos State Secondary School students' societies contributed to high pre-marital sexual behaviour and resulted to STIs epidemics which altered HIV prevalence in this group (Oloko and Omoboloye, 2004).

4.6.2 HIV/AIDS therapeutic measure in Lagos State

Lagos State is one of the states giving more attention to therapeutic measures. The FMOH (2004) stated that Lagos State should be the first state to increase their antiretroviral therapy (ART) centres to include local primary health centres in the various local government. Lagos State Government (2000) formulated a policy to the

Lagos State Ministry of Health dictating that all pregnant women coming for treatment and maternity care should be screened for the HIV virus. This policy reduced the transmission of the HIV virus and promoted prevention of mother-to-child transmission (PMTCT).

Presently all of the Lagos State general hospitals provide HIV/AIDS therapeutic activities for pregnant women and family support for people living with HIV/AIDS. One of the duties of LSACA is to monitor and evaluate HIV/AIDS therapeutic activities with Lagos State. The contributions of private actors (such as NGOs and the United Nations) are not undermined. In Lagos State therapeutic measures such as the provision of Voluntary Counselling Testing (VCT) is being expanded (de Bruyn, 2006).

4.6.3 Local AIDS control agency (LACA)

The Local AIDS Control Agency (LACA) was established by NACA in all 774 local governments of the Federation as result of an emergency approach to address HIV/AIDS prevalence in 2000 as stated in Chapter 1. LACAs are directly under the State AIDS Control Agency (SACAs). LACA staff comes from local government department of Health. There are LACA operations in the in twenty local governments of Lagos State, overseen by the LSACA (Lagos State AIDS Control Agency) for monitoring and evaluation.

LACAs are close to the communities and their activities are mainly awareness and education, supported with NGOs parallel activities. They act as implementers for programmes on health relating to HIV/AIDS and family planning at the community

level. LACAs are supported by traditional rulers (kings, chiefs and baales) and other community Leaders (NACA, 2010). LACAs in Lagos State are not fully effective; due to the behavioural factors of the HIV/AIDS risk groups and limitations on the clinical services for people living with HIV/AIDS in their respective communities (Adeneye *et al.* 2006).

4.6.4 Non-governmental organisation on HIV/AIDS in Lagos State

Current discourse on HIV/AIDS in Lagos State is highly influenced by Non-Governmental Organisations (NGOs) in terms of finance, education and awareness. Their common goal is to increase knowledge and empower individuals to demand quality family planning, prevent STIs outbreaks and alter the HIV/AIDS prevalence. Local NGOs working on HIV/AIDS are active in the Lagos State in monitoring the trends of HIV risk factors (such as STIs and STDs) through the provision of clinical services in communities. There are many NGOs working on health related and HIV/AIDS (and other heal-related aspects) with different projects and aims (Keating, 2006).

4.7 HIV/AIDS prevention and behavioural change in Lagos State

Behaviour change communication (BCC) is the process of communicating to individuals and the community for the purpose of changing unfavourable behaviours and attitudes to those that are favourable (RTI International, 2004). BCC provides information about an issue and helps people to sustain and maintain good behaviour in the long term. There are seven steps in the evaluation of BCC in a case study, as shown in Figure 4.3.

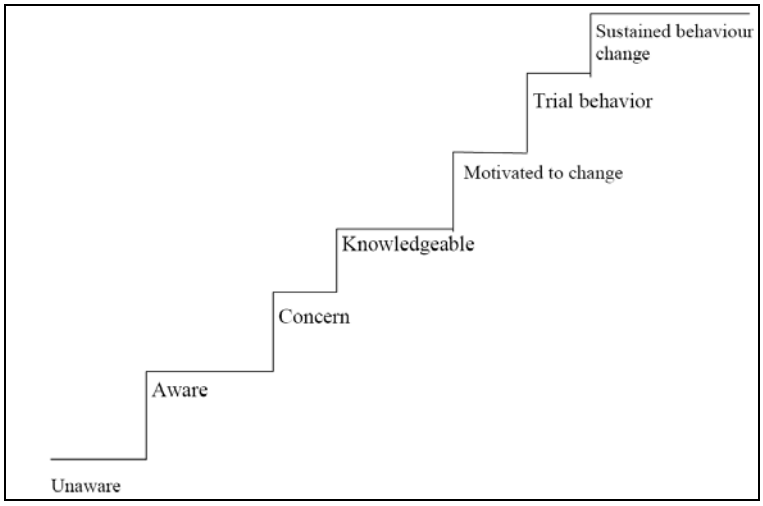


Figure 4.3 Seven steps of BCC (Kajimu *et al.* 2004, cited in RTI).

International communities have developed education and awareness indicators as a prevention strategy for HIV/AIDS (detailed Chapter 3). It has been globally established that strategies involving information, education and communication have improved the result of HIV/AIDS prevention initiative; and also boosted HIV/AIDS awareness in the developed world (Hubert *et al*. 1998). WHO (2002), reaffirmed that the spread of HIV/AIDS is driven by human behaviour due to lack of knowledge on especially concerning infection through the contact of bodily fluids (see Figure 4.4).

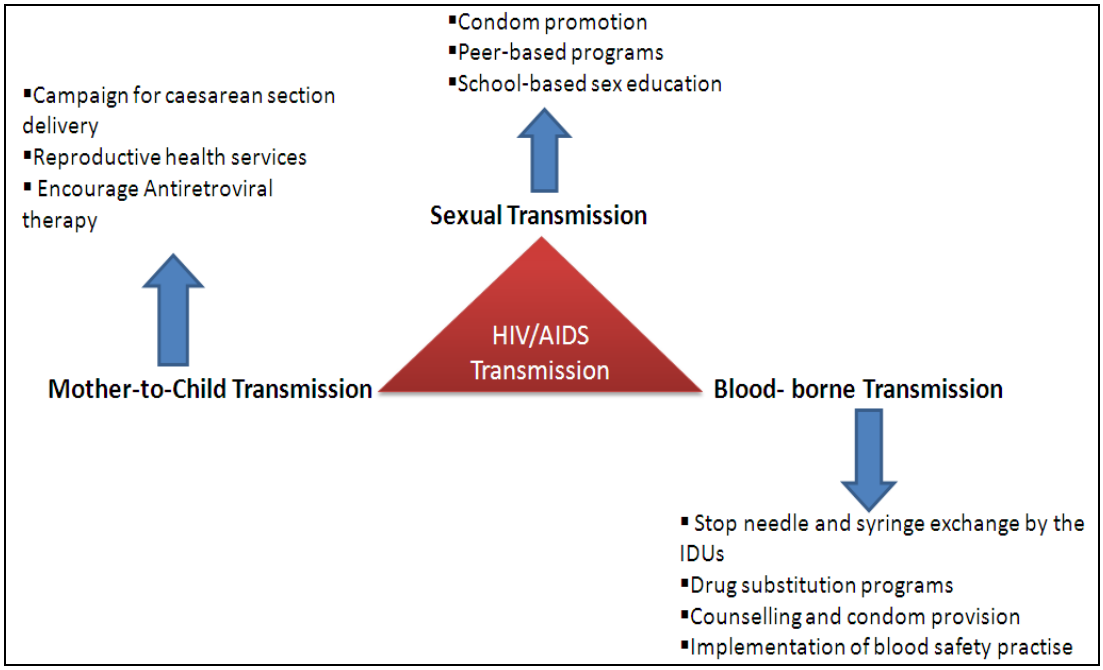


Figure 4.4 Prevention strategies outlines

The LSACA response review (2000-2005) refers to pilot research which demonstrated prevention and behavioural change indicators that quantified community-based inequalities regarding individual understanding about HIV/AIDS. Education and awareness activities regarding prevention and behaviour change involve the use of behavioural change indicators such behaviour change communication (BCC) services via non-governmental organisations (NGOs), faith-based organisations and community-based organisations (CBOs). These activities involve use of the following:

- Collaboration with media practitioners in the use of multi-media strategies for the provision of information, education and communication about HIV/AIDS and STIs.
- Holding regular HIV/AIDS information and advocacy rallies.

- Holding regular training / workshops/ seminars for individual, groups and communities capacity leader.
- Establishing and sustaining community-based HIV/AIDS/STIs information and education programmes in all twenty local governments (LACAs).
- Integrating HIV/AIDS/STIs IEC into the existing communities Primary Health Care (PHC) system.
- Constantly evaluating distributed IEC materials.

According to the LSACA response review 2006-2010, prevention and behaviour change communication constituted 80% of the work groups' intervention with high-risk groups; Lagos State implemented the National HIV and AIDS BCC Strategy in Lagos State. Behaviour change has been encouraged among the residents of Lagos State with the aim of achieving 50% change in behaviours such as abstinence, safe sex and mutual fidelity. The current prevention behavioural change indicator in Lagos State, shows that the use of male condoms is 48.7% compared to a previous value of 30.1%. Condom use by non-married men has increased from 50%-68%. LSACA (2010) reaffirmed that many people are infected with the HIV virus in spite of the educations and information activities provided by the governments' agent and NGOs.

4.7.1 Lagos State HIV counselling and testing (HCT) services

The stakeholders working on counselling and getting people screened and tested for the HIV virus are recognized as a key component of the HIV prevention and care programme by primary health care groups (LSACA, 2010). The first step in a HIV prevention programme is to counsel people against HIV transmission, followed by a HIV/AIDS test. There are currently 32 organizations providing mobile HCTs services and over 100 organizations providing HCTs services in 56 operating sites (LSACA Referral Services, 2010).

The locations of HCT centres and their response towards population-based activities need to be addressed in order to understand behavioural change towards HIV/AIDS. Their services include providing education about HIV transmission and HIV/AIDS for people living with HIV/AIDS (PLWHA). Their activity includes moving from one area to another (within same LGA or Division) and targeting events that involved the risk groups and addressing risk factors such as the spread of sexually transmitted infections (STIs). HCT services have dynamic evaluation behavioural indicators, such as for PLWHA, PMTCT and open masses. Their activities involve the use of IEC materials such as leaflets, media structures (bill board) and campaigns.

4.7.2 Training and workshop

The extent of the HIV/AIDS epidemic in Lagos State calls for frequent capacity developments of all the stakeholders in the network. Capacity building activities of the stakeholders working on HIV prevention (IEC, HCT, Monitoring and Evaluation, Care and Support) have been consistent and functional through joint training and workshops (LSACA, 2010). Stakeholders' capacity development includes human capital, organization management, aggressive human management, public sectors institution, network linkage, social capital and community awareness (via CBOs).

The LSACA confirmed that frequent meetings have positively influenced the cooperation between members of the network. LSACA improved the capacity of the members in the network by using trained staff in order to create a good learning environment for education and training. The efficacy of the LSACA's capacity development was shown in the Lagos State HIV/AIDS response review (2010-2015).

4.7.3 HIV/AIDS care, support and treatment

LSACA partnerships with international organizations are extended beyond the national level (NACA) in order to provide psycho-social support, nutritional support, economic support and educational support for vulnerable children. Figure 4.5 shows the LSACA care, support and treatment structure with the cooperation of the entire stakeholders.

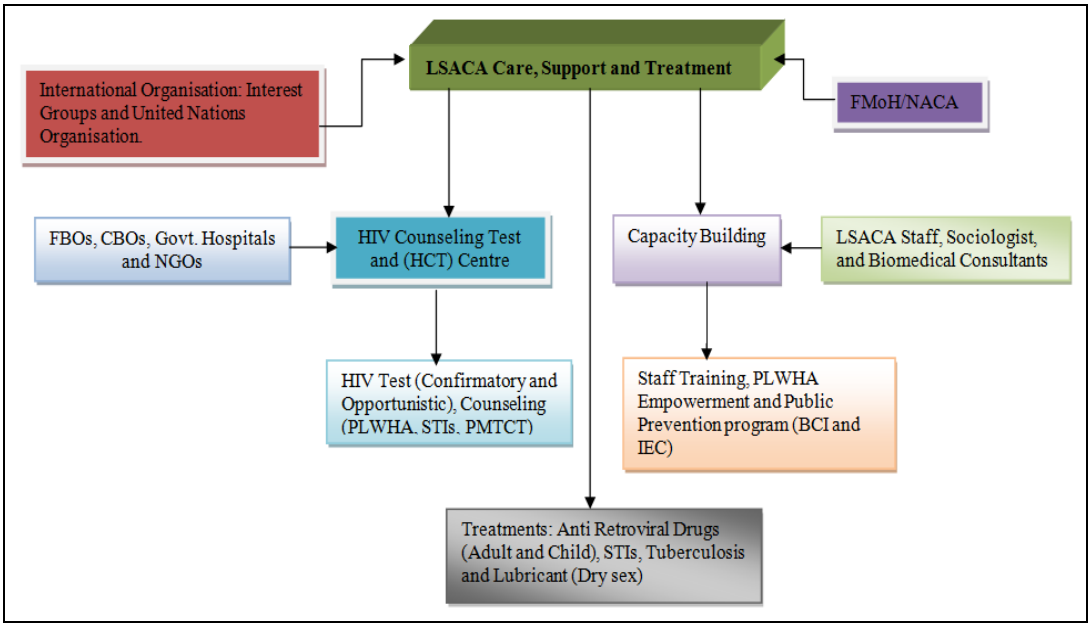


Figure 4.5 Lagos State HIV/AIDS care, support and treatment

Services being provided by LSACA and the entire network through HCT centres in Lagos State span confirmatory test, opportunistic infection treatment (STIs and STDs), tuberculosis lesion and treatment, adult antiretroviral therapy, paediatric antiretroviral therapy, laboratory-based research and Milk supplement for PMTCT therapy. International organization supports also provides health care for People living with HIV/AIDS (PLWHA). LSACA operates HIV care, support and treatment in all twenty LGAs in Lagos State with the general hospitals, primary healthcare centre (PHC), local governments' health department, the military hospital (army, air force and navy), Lagos State University Teaching Hospital (LASUTH) and the University of Lagos Teaching Hospital (LUTH). The support extends beyond clinical input and includes prevention indicators activity (IEC and Behavioural Communication and Information - BCI).

The care of orphans and vulnerable children is a priority for the State Government, LSACA and other stakeholders (though there is limited information about this due to the level of vulnerability and litigation involved). UNICEF and LSACAs networks have common goals for their activities; care and support includes the provision of food, education (including scholarships), recreational materials, nutritional support and palliative care for end-of-life HIV/AIDS babies in orphanage. The major constraint is that there are few NGOs working on care and support in the LSACA network and Lagos State. LSACA (2005) described the involvement of private health practitioners in the care and support of people living with HIV/AIDs as not particularly encouraging. Lagos State line Ministries are shown in Table 4.3.

Lagos State Line Ministries	Systems and Structures (14)	Planning and Documentation (11)	Implementation Capacity (11)	Total (36)	% of Total
Agriculture	12.70	10.00	8.00	30.70	85.28
Information and Strategy	12.00	10.75	7.00	29.75	82.64
Health	9.80	10.70	6.00	26.50	73.61
Transportation	9.25	7.75	5.00	22.00	61.11
Rural Development	8.80	7.00	5.00	20.80	57.78
Women Affairs	8.50	6.00	5.00	19.50	54.17
Home Affairs	9.25	6.50	1.00	16.75	46.53
Local Government and Chieftaincy Matters	6.50	8.00	2.00	16.50	45.83
Justice	6.50	8.00	2.00	16.50	45.83
Education	4.50	7.00	2.00	13.50	37.50
Youth & Sports	4.50	8.00	0.00	12.50	34.72

Table 4.3 Performance of the various line Ministries (LSACA, 2010)

The performance of the Ministries regarding HIV/AIDS care and support are arranged in descending order. This takes into account systems and structures, planning and documentation and implementation. The overall scores range 85.28% to 34.72%.

4.7.4 Capacity building

Lagos State AIDS Control Agency (LSACA) and the stakeholders in the network work towards common goals in building a capacity knowledge structure to address the challenges in both clinical and non-clinical situations, as described above in Figure 4.2. The partnerships stretch beyond Nigeria and join with international organizations to support current initiatives regarding HIV/AIDS care and treatment. Capacity building ranges from management issues, basic science issues and operational activities on HIV/AIDS. LSACA established a strong active network that is involved in capacity building and uses knowledge from contributors outside the network.

The LSACA activity at the building capacity level includes training (LACAs staff, PLWHA, and biomedical staff) on prevention and transmission of the HIV virus. Biomedical staffs are educated about the disposal of sharps and clinical wastes to prevent HIV transmission. Capacity building is evaluated and monitored through the use of behavioural indicators on IEC/BCC. LSACA trained LACAs staff regarding HIV education and behavioural issue as it is the organization in the network that is closest to the communities.

PLWHA are trained and educated about risk factors such as STIs, STDs and pregnancy gestation. LSACA recognizes and collaborates with traditional medicine. Traditional birth attendants are educated about HIV/AIDS prevention and transmission. Capacity building is more pronounced at the community level. Lagos State line Ministries and Local Governments have been supportive in the area of capacity implementation of LSACA programmes with the State. Figure 4.6 shows the level of capacity implementation.

Figure 4.6 Implementation capacity scores (%) (LSACA 2010)

4.7.5 Anti-retroviral drugs (ARVs)

The use of antiretroviral (ARV) drugs is powerful predictors of survival for people living with HIV/AIDS (Smith and Mbakwem, 2007). Anti-retroviral drugs are available in various types - the prescription depends on the

diagnosis and prognosis of the patients. It is a great achievement of the United Nations organizations (UNICEF, UNAIDS, and UNDP) that ARVs are now available in third world countries with little or no cost. LSACA and the partners established an active network for the use of anti-retroviral drugs in clinical trials, treatment and therapeutic measures. It is one of the responsibilities of LSACA to ensure the availability of antiretroviral drugs in centres within Lagos State.

There are 24 specific stakeholders (NGOs and hospitals) that have been given the task by the Lagos State Government and NACA of administering ARVs to patients in need. The centres are also expected to address and manage of patients with opportunistic infections such as STIs/STDs and TB/HIV collaboration services (LSACA, 2010). Today, LSACA is proud of having a constant supply of approved ARV drugs to all their centres in Lagos state. It is less easy to supply to people in rural areas due to a low awareness of the drugs and the incapacitated state of the primary health care system in rural areas. The primary health care (PHC) system in Lagos State is undergoing restructuring in this current administration.

4.8 Lagos State HIV/AIDS epidemiology

LSACA and other stakeholders in the network are trying to address HIV/AIDS in the Lagos State. The Figure 4.7 shows the trend of HIV/AIDS in Lagos State from 1991 to 2008. A survey was produced from pregnant

women aged 15-49 as a controlled risk group, attending the ANC clinic for their first time during the current pregnancy (LSACA 2010). The disparity in HIV/AIDS prevalence between 1991 and 1999 in Lagos State (as shown in Figure 4.7) raised concerns for the Federal Government and international communities but the graph shows the effect of the activities of LSACA and the stakeholders since 2001. In 2009, the Lagos State Government relied on LSACA and their stakeholders on HIV/AIDS to address epidemiology drivers as projected for 2015 (LSACA, Strategic plan 2010-2015).

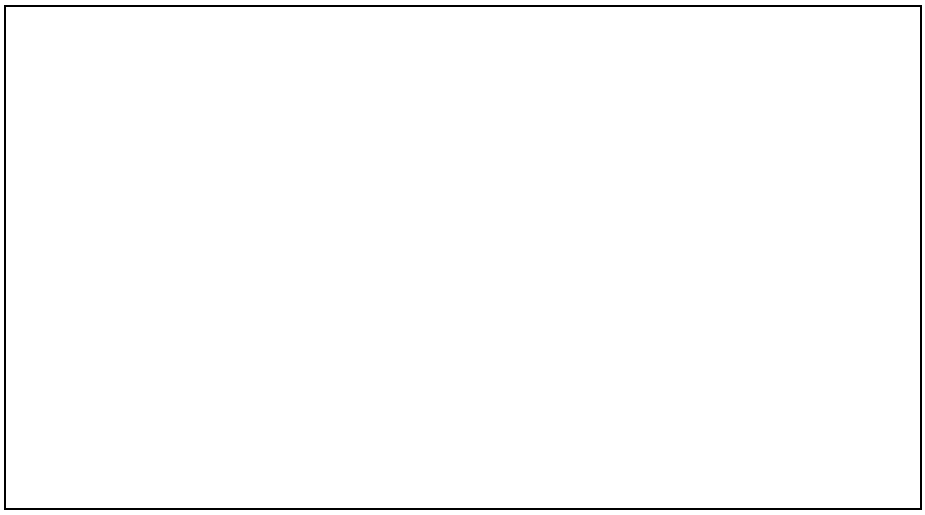


Figure 4.7 Lagos State HIV/AIDS epidemiology (LSACA, 2010).

4.8.1 Lagos State HIV/AIDS age and geographical distribution

Most areas in Lagos state are categorized as predominantly urban centres due to the distribution of developmental factors. It is known for commercial activities and the provision of standard educations in Nigeria, accounting for a concentration of active young people. The Sentinel surveys between year 2005 - 2008 in the urban centres of Lagos State are shown in Figure 4.8.

Figure 4.8 HIV prevalence among age group 15-24 years (LSACA, 2010).

Young people aged 15-24 years are identified as one of the risk groups for HIV/AIDS in Lagos State. The Lagos State Ministry of Health established that STIs are common among the age group 15-24 years. This is recognized as risk factor for HIV/AIDS. LSACA and other stakeholders identified the geographical distribution of HIV/AIDS in Lagos. It was established from antenatal clinic surveys from 2003 -2008 (using age group 15-49 years) that there was a steady growth in HIV prevalence in the urban centres relatively to rural areas. The analysis showed a steady growth in HIV prevalence (shown in Figure 4.9).

Figure 4.9 HIV prevalence rate (15-49 years) in Lagos State (LSACA, 2010)

A survey was carried out in many geographical locations of Lagos State included both urban centres and rural areas (as described in Chapter 3). Agbowa is categorized as a rural area in the Epe division, while Ijede is a potential rural area in the Ikorodu division. A critical view of Figure 4.9 shows different patterns of distribution in various locations. The incidence of HIV/AIDS was consistently higher in Lagos Island compared to any other location in the survey between 2005 - 2008. LSACA identified risky behaviour as the factors responsible for the geographical variation.

4.9 Challenges facing LSACA and the strategic plan for 2010-2015

LSACA identified challenges relative to their thematic work groups. This research will critically review the challenges facing LSACA and evaluate

HIV/AIDS education under the following thematic working groups: (i) Prevention and behavioural (ii) Care, treatment and support (iii) Monitoring and Evaluation, Research and Surveillance. All these groups are associated with the aim and objectives of this current research. The challenges facing LSACA are insufficient funding and complexity of HIV/AIDS in Lagos State, including low strength capacity building on knowledge management and effective management of human resources. LSACA and biomedical professionals are working in isolation. The States' line Ministries and other parastatals are not performing to expectation on HIV/AIDS (LSACA, 2010).

Lagos State has a weak HIV/AIDS monitoring and evaluation system in the area of database, programmes implementation, healthcare information management system and statistical supports. Implementation of the NACA strategic plan on HIV/AIS committed all States AIDS Control Agencies (SACAs) in the Federation to their strategic plans every five years for better monitoring and evaluation. According to LSACA (2010) their strategic plan for 2010 to 2015 is to drastically reduce HIV/AIDS incidence in Lagos State by strengthening the thematic goal of stakeholders working on the following tasks:

- Opportunity infection (STIs and STDs)
- HIV counselling and testing awareness (HCT)

- Prevention and support of mother-to-child transmission of HIV (PMTCT)
- Behavioural Change Communication (BCC) and condom promotion
- Prevention and support of PLWHA
- General awareness program on prevention and transmission of HIV.

4.10 Summary

The chapter has discussed Lagos State's socio-political status and its informal educational (parastatals) setting. The Lagos State AIDS Control Agency (LSACA) is the backbone of HIV antiretroviral therapy in the state and achieves this with the help of its members and international organisations and Lagos State Primary Health Centres. LSACA has been performing well but faces challenges regarding HIV/AIDS awareness activities and measures to change behaviour. It has set target to address these challenges by 2010-2015.

5 Analysis

This chapter presents a detailed analysis of respondents' demographic profiles. Sections 5.2 and 5.3 analyse respondents' knowledge on HIV/AIDS transmission and stigmatisation whilst Section 5.4 evaluates the efficacy of HIV counselling and test centres with respect to respondents' behavioural change communication (BCC). Section 5.5 discusses the use of mobile phones among the Lagos State students; Section 5.6 considers inferential statistics using chi-square test. Section 5.7 concludes the chapter with a short summary.

5.1 Demographic profile and data analysis

This chapter analyses the collected data, detailing input concerning HIV/AIDS prevention, Information Education Communication (IEC), Behavioural Change Communication (BCC), Behavioural Change Information (BCI), prevention and transmission and awareness of HIV counselling and testing centres of the selected risk group in Lagos State Schools. The use of mobile phones among the selected risk group was evaluated as this has been suggested as a way of introducing technology into HIV/AIDS activities in Lagos State. The indicators from Table 3.1 (Chapter 3) were used to design the questionnaires and are shown in Table 5.1.

Categories	Indicators
Prevention: IEC/BCC/BCI	HIV/AIDS awareness in all the LGAs HIV/AIDS awareness on Transmission HIV Understanding and the Risk group Understanding of Risk factors (STIs) Evaluation of HIV/AIDS Stigmatization Investigation of Telemedicine
Prevention and Transmission	Use of Condoms Total abstinence from sex Avoidance of casual sex Geometrical implication on HIV/AIDS transmission in Schools. Evaluation of the use of IV drugs
HIV Counselling and Testing (HCT) Centres	Number of HCT Centres declared Attitude towards HCT Evaluation of activities of HIV counsellors Availability of IEC materials in the communities

Table 5.1 Research indicators

The Literature Review (Chapter 2) described HIV prevention strategies in three categories: (i) sexual contact transmission, (ii) blood-borne transmission and (iii) mother-to-child transmission. This chapter will provides a detailed analysis regarding the understanding of HIV/AIDS among the selected risk group (young students). Students are recognised as a vulnerable risk group due to the lack of health education and decision-making in this group. The factors, categorised into Lagos State divisions, that make them vulnerable are sexual behaviours, drugs and the use of sharps.

Respondents' demographic profile

It is essential to provide demographic details of the respondents in the order of the designed questionnaire as shown in Section A. The breakdown of the demographic factors of this research will justify the design of the survey with respect to the targeted risk group (young students). The demographic profile describes respondent details or personal attributes in research domain (Brown *et. al.*, 2003 and Szinovacz, 1998). The analysis shows respondents' demographical profiles (Section A), with details appearing in the order that they appear in the questionnaire. These are gender, age, marital status, religion, local government area and education. These profiles are associated with HIV/AIDS and the risk group.

5.1.1 Gender

In Section A, Question 1 looks at how gender has been used globally to compare social characteristics of HIV/AIDS activities. Gender vulnerability varies from region to region with respect to risk factor issue(s). It was found that women are more vulnerable to the HIV virus in Africa than other continents due to behaviours associated with the risk factors of HIV/AIDS transmission (Bond and Kwesigabo, 2004). This research includes gender in order to study the behaviours of students with respect to the research indicators. Appendix III, Table 5.2 shows respondents' gender recorded during the survey in Lagos State Schools. The survey split into 421 (43.9%) male and 535 (55.8%) female students; 2 (0.2%) students did not indicate their gender. Gender is an important dimension in understanding the state of awareness and education among the selected risk group and an important determinant of HIV risk factors.

5.1.2 Respondents' age

The effects of age on peer group's activities are factors of maturity and decision-making. Section A (Question 2) look at age a factor that contributes to the HIV epidemic. The activities of young people are addressed as an issue relevant to the epidemic. Chapter two (Literature Review) of this thesis discusses the behaviour of young people as a HIV/AIDS risk factor associated with drug use and sexual behaviour. According to LSACA (2010), the age group 15-24 years are vulnerable in Lagos State. Figure 5.1 shows the respondents in this survey.

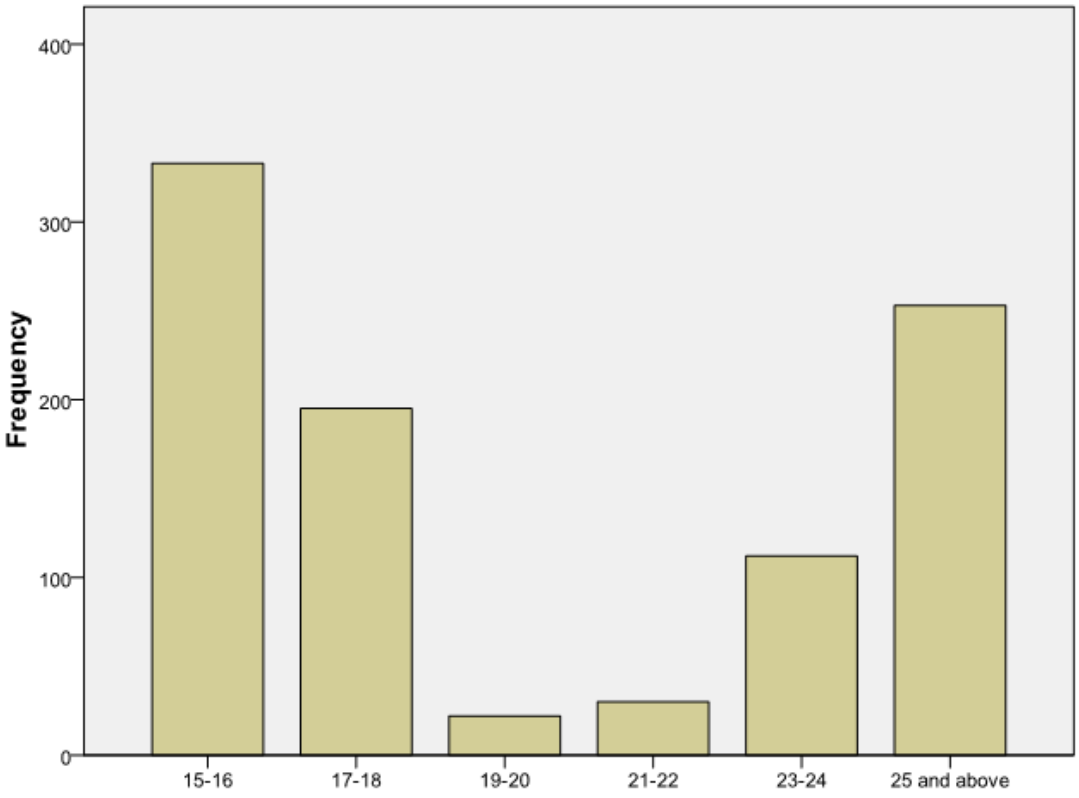


Figure 5.1 Respondents' age groups

The age group pattern above shows the Nigerian educational system (6-3-3-4) with respect to age variation. The breakdown of the age groups are as follows: 15-16 years

old consisted of 333 students (34.8%), 17-18 years old consisted of 195 students (20.4%), 19-20 years old consisted of 22 students (2.3%), 21-22 years old consisted of 30 students (3.1%), 23-24 years old consisted of 112 students (11.7%), and the category 25 and above consisted of 253 students (26.4%).

5.1.3 Marital status

The risk of HIV in marriage is directly associated with faithfulness and this is viewed as a demographic factor (section A, Question 3) for HIV transmission. In Chapter 2, marriage is viewed as risk factor if polygamy is involved. Single people are able to participate in activities that are associated with HIV transmission such as drug use and sexual behaviours. High bride price is a cultural practice that militates against early marriage in Nigeria and affects the incidence of premarital affairs, prostitution, engaging in casual sex and human trafficking. Divorcees and widows are at risk of HIV due to their vulnerability to sexual activities (Ajuwon *et al.* 1995). Separations in relationships also increase the number of partners. The breakdown of the respondents is as follows: single 822 (85.8%), married 95 (9.9%), divorced 5 (0.5%), widowed 2 (0.2%) and separated 4 (0.4%). The analysis will focus on single young people and factors associated with the HIV/AIDS education in Lagos State.

5.1.4 Religion

Religion is an identity of worship, norms and myths. Section A (Question 4) categorised religion into three main groups: Christianity, Islam and Traditional Religion. Religious activities such as polygamy and wife-sharing have a negative influence on HIV transmission. Islam encourages polygamy while Christianity forbids adultery and fornication. Nigerian traditional religion encourages

betrothing, polygamy and widow inheritance. The breakdown of the respondents' religions is: Christianity 681 (71.1%), Islam 265 (27.7%), Traditional 1 (0.1%) and Other 1 (0.1%).

LSACA involves faith-based organisations (FBO) in the activities associated with HIV/AIDS in the Lagos metropolis, such as the Christian Association of Nigeria (CAN), National Islamic Council of Nigeria (NICN) and traditional groups ("Ise-se lagba"). Youth wings of FBO (campus based) are not omitted in the Lagos State HIV/AIDS activities and include the Christian Campus Fellowship (CCF), Christian Campus Unification (White Garment) and Muslim Students Society of Nigeria (MSSN).

5.1.5 Respondents' local government division

The results from Section A (Question 5) reveal that Lagos State have 20 local governments councils which are categorised into five divisions (Badagry, Epe, Ikeja, Ikorodu, and Lagos Island). The State divisions are used to monitor resource allocation and developments. Further analysis into divisional classes is shown in Figure 5.2.

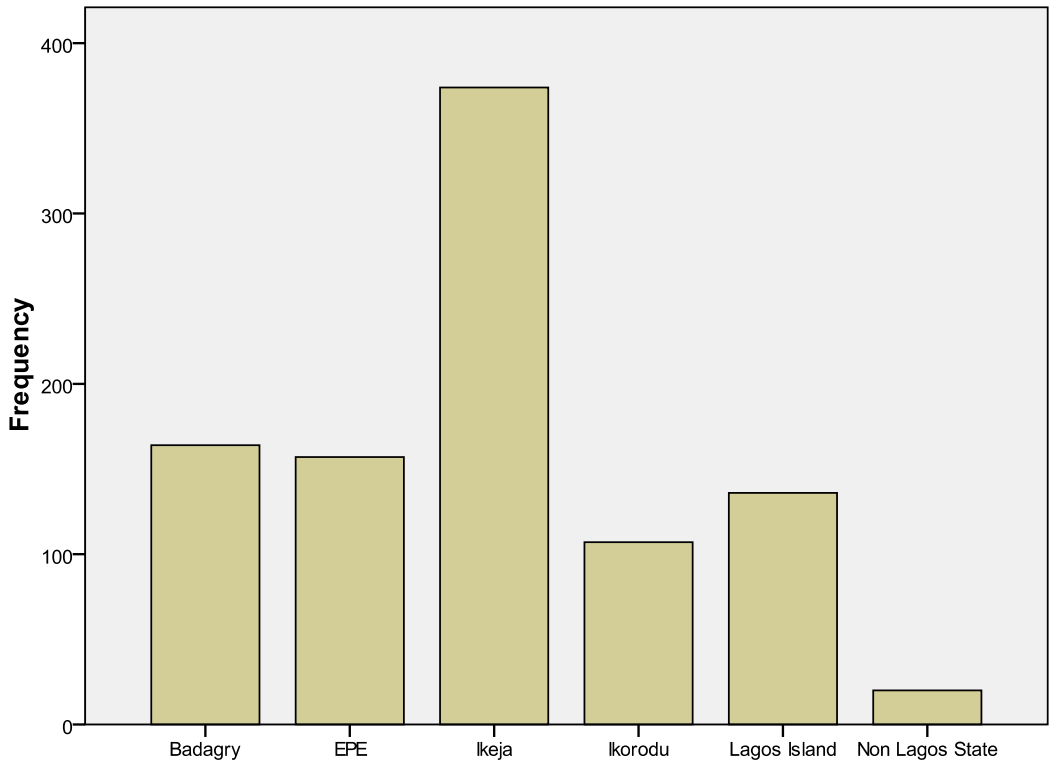


Figure 5.2 Respondents' local government division

The breakdown of respondents into their respective divisions shows Badagry (164, 17.1%), Epe (157, 16.4%), Ikeja (374, 39%), Ikorodu (107, 11.2%) and Lagos Island (136, 14.2%). The survey also recorded recognised non-Lagos State residence (20, 2.1%) as students are also potential contributors to the transmission of HIV/AIDS. The bar chart above (Figure 5.2) shows the population concentration in the Ikeja division. Lagos State University and the Lagos State College of Education are situated in the Ikeja division. The Ikeja division has the highest number of primary and secondary schools in the state (Lagos State Ministry of Education, 2010). The results (Figure 5.2) show that the Ikeja division should be given priority over other divisions when tackling the problem of HIV/AIDS among the student population.

5.1.6 Respondents educational levels

Section A (Question 7) considered respondents' educational levels. Nigeria runs a 6-3-3-4 educational system: six years for primary education, three years for junior secondary school education, three years for senior secondary school education and a minimum of four years for tertiary (university, polytechnic and colleges of education) programmes (Lagos State Ministry of Education, 2010). Pupils start primary education at age six and are expected to complete secondary school at eighteen. This is a vulnerable age for HIV/AIDS transmission.

There are 312 public senior secondary schools (SSS) with 265,465 pupils (Lagos State Ministry of Education, 2010). Lagos State tertiary institutions operate satellite campuses with private educators within the state. Lagos State educational sites (campuses) are socially isolated due to the social factors in the metropolis. The breakdown of the respondents in their respective educational levels is: SSS1 (156, 16.3%), SSS2 (189, 19.7%), SSS3 (226, 23.6%), university (378, 39.5%), polytechnic (1, 0.1%) and college of education (6, 0.6%). Senior secondary students are at a vulnerable age while the upper levels (tertiary classes) are adults and regarded as in a "state of freedom". Nigerian students utilize the advantage of education to free them from restrictions at home. They are vulnerable to HIV/AIDS (via sexual activities, cultism and drugs).

5.2 Respondents knowledge on transmission

Section B of the quantitative questionnaire evaluates the respondents' HIV/AIDS knowledge in order to identify gaps and draw inferences. The section uses indicators to evaluate the understanding of the respondents regarding HIV/AIDS

(transmission, sexually transmitted infections (STIs) and risk groups). This sub-section records the respondents' knowledge of HIV/AIDS transmission.

5.2.1 Understanding on HIV

Section B (Question 1) aimed to test respondents' understanding of the definition of HIV. Since the first case of HIV/AIDS in 1985, it has had a substantial impact on the Nigerian mortality rate. HIV/AIDS is still a challenge to the health sector and the capacity builders in Nigeria. Researchers have confirmed the following to be potential HIV/AIDS risk groups: students, biomedical staff, migrant workers, sexual workers, truck driver, intra-venous drug users (IDUs) and military personnel. The identified risk factors of HIV/AIDS are unsterilized sharps, drugs, and sexual transmitted diseases (STDs).

Respondents were tested on the basic meaning of HIV/AIDS. In answering the question "What is HIV?", 776 (81.0%) students responded accurately, 136 (14.2%) students responded inaccurately and 27 (2.8%) respondents were unsure. This is a challenge to the Lagos State Ministry of Education and concerned stakeholders to improve HIV awareness in the pupils at all Lagos state schools and in recognised risk groups.

5.2.2 "Where is HIV found?"

Section B (Question 2) evaluates the understanding of respondents regarding the body chemistry of HIV by asking them, "Where is HIV found?" The HIV virus integrates itself into blood components during a "window period" (Chapter 2) to establish opposition to the functions of white blood cells and take control of the

human immune system. AIDS is established at the end of the window period – asymptomatic stage (Olawoye *et al*. 2007). The HIV virus is a blood-borne disease and present in all the blood products of an infected person. The infected person will be susceptible to external infections such as rash, coughs (Tuberculosis - TB) and fevers (as they have low immunity). The respondents' responses to the question "Where is HIV virus found?" were: nail (50, 5.2%), hair (30, 3.1%) and blood (869, 90.7%). This is a significant response and relevant for the Lagos State AIDS Control Agency (LSACA).

5.2.3 Respondents understanding of HIV/AIDS transmission

Section B (Question 3) quantifies and identifies respondents' knowledge of HIV/AIDS transmission as a good indication of HIV awareness. The survey recorded respondents' understanding of HIV/AIDS transmission by asking them a multiple choice question. For the question of "*How is HIV/AIDS transmitted through?*" the response options were: mosquito bites, homosexual intercourse, heterosexual intercourse, drug abuse/sharing syringes, blood and blood product, touching, kissing, trans placenta, breast milk and handshakes. Respondents were required to choose more than one option. The breakdown of the responses shows that 339 (41.6%) students responded correctly to the question with a minimum of three (options) variables, while 526 (54.9%) students were not correct.

The breakdown shows that potential risk groups in formal organised environments do not have a basic understanding of HIV/AIDS transmission. This is a challenge to all the stakeholders working with these groups in Lagos State and shows the extent of the vulnerability of students. Students are a significant risk group that bridge

communities in the settlement and geographical context. This requires a "fast response" approach. The Lagos State Ministry of Education and concerned quarters should introduce programs to alert students to these basic risk factors and increase their understanding of HIV/AIDS transmission.

5.2.4 Respondents awareness on HIV/AIDS symptoms

Section B (Question 4) examined respondents' general knowledge of HIV/AIDS signs and symptoms. The human immuno-deficiency virus attacks the immune system of an infected person (host) and makes them vulnerable to other diseases such as viruses, fungal and bacterial infections (as detailed in Chapter 2). In the initial stage of the HIV infection, the host remains asymptomatic (shows no symptoms) for quite a long time (Adeniyi *et al*. 2006). HIV/AIDS symptoms are complex to analyse as they are associated with abnormal counts and present with infections known as *opportunistic infections*. Physically, most of the HIV-related symptoms in Nigeria are confirmed when present with tuberculosis (persistent cough), loss of weight, meningitis, skin rashes, swollen glands, persistent fever and diarrhoea (Olawoye *et al*. 2007).

Awareness of HIV/AIDS symptoms should be increased, in order to warn those in risk groups and prompt them to have a test for HIV. The respondents were asked "What are the sign and symptoms of HIV/AIDS". The questionnaire requested respondents to choose HIV-related symptoms from the listed options. The breakdown of their responses is that 437 (45.6%) students were knowledgeable while 471 (49.2%) were not. This revealed that Lagos State students are not knowledgeable about HIV virus symptoms. This suggests that students may have HIV-related

symptoms and fail to seek help until the palliative stage (end of life). LSACA and all stakeholders should empower risk groups with knowledge of HIV/AIDS symptoms. This will help to increase the efficiency of LSACA therapeutic measures and improve the mortality rate.

5.2.5 Respondents' view on risk age

Section B (Question 5) asked whether respondents' would identify themselves with an HIV/AIDS risk age group. HIV/AIDS infection and transmission is associated with youthful activities such as sexual behaviours and drug use. Literature has linked the infection rate with the age of hosts in the developed world. STIs are associated with teenagers and sex workers in California, USA and Italy (see Chapter 2). Intra-venous drug users (IDUs) are common within the active age group (15–25 years) which makes them vulnerable to HIV infection. Sex workers are common in the Lagos State metropolis as this is an easy source of income for the females in the active age group. The survey evaluates the understanding of respondents regarding the HIV/AIDS risk age by asking *"What age range is more commonly affected by HIV/AIDS"*.

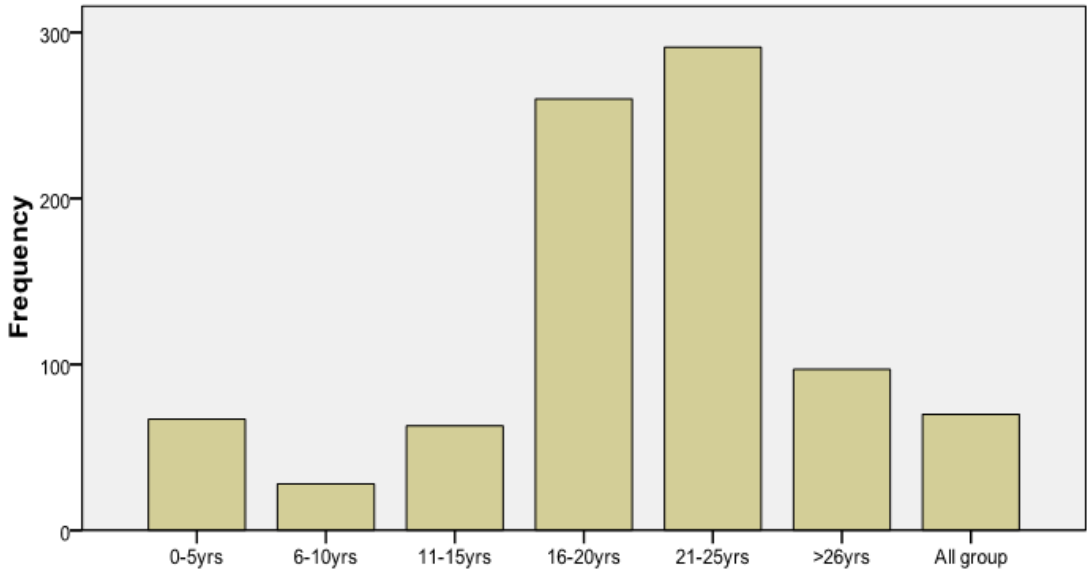


Figure 5.3 HIV/AIDS risk age

Figure 5.3 shows the respondents' views regarding the age group most affected by HIV/AIDS. The research team chose students in the age category of 15-24. The literature confirmed that the HIV/AIDS risk age falls within 15 – 24 years of age. This survey shows that this is the age that should be targeted by the Lagos State HIV/AIDS stakeholders if they are to improve the efficiency of the measures they are taking to control the prevalence of HIV.

5.2.6 HIV/AIDS high risk groups

Section B (Question 6) aimed to identify potential risk groups through the respondents' knowledge of HIV/AIDS transmission. The Literature Review (Chapter 2) discussed groups that are prone to HIV viral infection. Several risk groups are listed in Chapter 2 as potential agents of transmission (vectors). The main concern is ("Are the risk groups aware of each other?") is a significant question; many of these groups are members as a result of behavioural challenges and

indiscipline. Military personnel and refugees are vulnerable to rape, commercial sex activities and drugs as a result of socio-political influence. Truck drivers, passengers and motor park workers are linked together as risk groups in the social network of transportation. Biomedical staff and HIV/AIDS patients are vulnerable to each other via "opportunistic infection".

Students are rated as a potential risk group in both formal and informal environments; they link communities together and are prone to outbreaks of STIs and STDs. The National Health Services, United Kingdom (2010) confirmed that one in ten in the age group 13 to 24 years is living with Chlamydia (HIV risk factor). This research suggested that night market traders are a HIV/AIDS risk group but Lagos State AIDS Control Agency (LSACA) claimed to be unaware of this. Respondents correctly identified day students as an HIV/AIDS risk group as they engaged in hawking in the streets of Lagos. Overnight marketers, students and homosexuals are rated as being at highest risk: 332 (34.7%), 234 (24.4%) and 226 (23.6%) respectively. Overnight and night street markets are common in the Lagos metropolis (Badagry, Epe and Ikeja divisions).

5.2.7 Sexually transmitted infections and diseases (STIs/STDs)

Section B (Question 7) examined respondents' understanding of sexual transmitted infection and diseases as a means of HIV transmission. Sexually transmitted infections (STIs) and sexually transmitted diseases (STDs) are categorised as HIV/AIDS risk factors by the public and community health biomedical officers working in epidemiology. They have been used as an index to monitor the HIV

incidence rate in the developed world (Calentano *et al*. 1998; and Fleming and Wasserheit, 1999).

STIs and STDs are grouped as blood borne transmission diseases and discussed in the Literature Review (Chapter 2). 80 percent of HIV viral transmission is via sexual means and caused by STIs and STDs. There are many tropical forms of sexual infections and diseases that are responsible and contribute to a high HIV prevalence in Nigeria. They include gonorrhea, syphilis, chancroid and thrush (Olawoye *et al*. 2007). According to public health officers in Ifako/Ijaye general hospital (Ikeja Division) most of the HIV infections are recorded after treatment for STIs and/or STDs. They can cause lesions on the sexual organs and open the skin and internal system for HIV infection.

This study found it essential to test students understanding of STIs as a risk factor contributing to the state of HIV/AIDS in Nigeria. The questionnaire was designed to capture basic awareness of STIs among the Lagos State students who participated in the survey. Students were asked the question "What are STIs?". 839 respondents (87.6%) identified STIs as risk factors of HIV/AIDS while 64 respondents (6.7%) said that STIs are not HIV/AIDS risk factors and 25 respondents (2.6%) were unaware. This will be of interest to the Lagos State HIV/AIDS stakeholders who need to address the awareness of students regarding HIV transmission.

5.2.8 Clinical remedy for STIs

Section B (Question 8) evaluates respondents' knowledge of STIs treatments. The term sexually transmitted infections (STIs) refers to transient states of disease,

presenting with an infected part of the body that occurs over a short period of time. It is vital for the host to understand the characteristics of the infection before it spreads. Developing nations have been tackling STIs as a factor contributing to HIV transmission among young people. The literature has shown that young people have little or no knowledge of STIs and as a result this has become an issue that is associated with HIV risk factors.

Most STIs deteriorate when they are not treated adequately and this may aid HIV transmission (Chan and Schlegel, 2002). STIs cause damage to female reproductive tracts and abnormalities to the male accessory organs (Patel *et al.* 2005). It is important to measure respondents' understanding of treatments for STIs. The survey (Appendix III, Table 5.12) shows 560 respondents (58.5%) claimed that they are aware of treatments for sexually transmitted infections (STIs), 100 respondents (10.4%) are not aware of any these while 251 (26.2%) respondents are not sure about treatment for STIs. The fact that 26.2% respondents are not sure of clinical remedy for STIs is a significant outcome which demands the attention of stakeholders working on HIV/AIDS activities in Lagos State.

5.2.9 HIV/AIDS cure

Section B (Question 9) evaluates respondents' knowledge regarding a cure for HIV/AIDS. Finding a cure for HIV/AIDS has been a global challenge for over twenty-five years. Treatment and therapeutic measures have been established in the developed world where adequate resources and technological advancement are present. The HIV virus is grouped into two strain types (see Chapter 2). These are

HIV-1 and HIV-2, in accordance with genetic clinical discrepancies (Meloni *et al.* 2004, Kanki and Adeyi 2004).

According to the US President's Emergency Plan for AIDS Relief (2011), 11 million Africans from thirty countries are receiving lifesaving antiretroviral treatment and therapeutic assistance. There is presently no cure for these strains but they are effectively managed in the developed world. It is essential to reiterate to all identified HIV risk groups that HIV/AIDS has no cure. The survey revealed 161 respondents (16.8%) claimed that HIV/AIDS has a cure, 584 respondents (61.0%) thought that HIV/AIDS has no cure while 189 respondents (19.7%) were not sure whether HIV/AIDS has a cure. This shows a need to increase awareness that HIV/AIDS having no present cure. The lack of knowledge could be a factor contributing to the incidence rate in Lagos State.

5.2.10 Avoidance of HIV/AIDS transmission

Section B (Question 10) examined respondents' general knowledge about HIV/AIDS infection avoidance. Adeniyi *et al.* (2006) reaffirmed that sexual transmission accounts for 80% of HIV/AIDS incidence cases in the world, while Olawoye *et al.* (2007) confirmed that 10% of HIV/AIDS cases in the world are transmitted from mother to the child either during the antenatal (pregnancy) or postnatal stage (lesion). Behavioural change challenges (BCC) and biomedical professional negligence accounts for 10%.

There are opportunities to avoid HIV infection and the survey examined respondents' views about HIV/AIDS avoidance by asking "*How can HIV/AIDS*

transmission be avoided?" Respondents were expected to respond by choosing options including faithfulness to partners, use of condoms for casual sex, behavioural change, single use of disposable syringes, screening all blood and blood products for HIV and vaccination. Table 5.14 shows the responses of the students.

The results were significant and showed that the risk group (Lagos State Students) were aware that HIV infection could be avoided by considering the factors responsible for HIV transmission. Faithfulness to partners and use of condoms for casual sex will reduce HIV infection via sexual transmission and partially prevent mother-to-child transmission (PMTCT). Single use of disposable syringes, screening all blood and blood products for HIV reduces HIV infection via blood transmission. Students (respondents) showed good knowledge by successfully identifying the possibility of avoiding HIV infection and transmission.

5.3 HIV transmission and stigmatisation

Section C evaluates HIV transmission and stigmatisation. The fears of HIV stigma has an adverse effect on the efficacy of HIV-transmission programmes across developing nations in Africa and contributes to the incidence rate (Rankin *et al*. 2005). Stigmatisation is one the main factors controlling the incidence rate in Nigeria as many people living with HIV/AIDS (PLWHA) refuse to declare their health status to their sexual partners and friends. Fear of stigma predicts a behavioural challenge and attitudes of young people towards checking their health status. This same fear affects many people living with the disease (HIV) without their awareness. Many young people are aware of their status (HIV positive), but still continue to fulfil their

sexual desires without considering that they are spreading HIV. Stigmatisation is another factor increasing the incidence of HIV in Sub-Sahara Africa.

5.3.1 Avoidance of casual sex

Section C (Question 1) evaluates casual sexual activities among respondents as a factor of HIV transmission via a sexual network. HIV transmission is preventable if populations are mobilized to avoid the risk of spread and expansion (linkage) of sexual networks (Stoneburner and Low-Beer, 2004). The survey tried to sample respondents' sexual status. Sexual activities are pronounced among the selected age group (15-24) in Nigerian schools. The social activity of secondary school students outside school hours are of concern to stakeholders as they are not under official supervision, while the tertiary students have the freedom of "social network" on their side as they are far from home.

Chapter 2 discussed the existence of sex workers as consequence of economic factors (poverty) and a lack of discipline. Prostitution in Nigeria is categorised as a behavioural challenge and a means of earning on the street (Bamgbose, 2002). Prostitutes include adolescents and teenagers of both in-school and out-school categories. Prostitutions promote casual sex and contribute to the HIV prevalence rate in the Lagos metropolis. Fixing the economy and empowering young people should reduce prostitution and address the behavioural challenges. Respondents were asked if they have more than one sexual partner (Appendix III, Table 5.15).

138 respondents (14.4%) confirmed that they have more than one sexual partners, 735 (76.7%) claimed that they do not have more than one sexual partner, while 1

respondent (0.1%) did not answer the question. There is a high probability that more of these pupils engaged in casual sex than was admitted. The implication of 138 respondents engaging in multi-sexual activities will have an adverse effect in their various communities. Students should be given adequate education on the implication of having more than one sexual partner at a time. Generally, sex education should be encouraged by parents and be considered as a parent-school authority issue. Lagos State Government should make micro-finance more effective in order to reduce commercial sex activities in the Lagos State metropolis.

5.3.2 Respondents casual sex activities

Section C (Question 2) examined the strength of casual sex activities among the respondents. HIV/AIDS manifestation is a function of time and the host immune system. Many infected people may not be aware that they are living with HIV infection until they are tested. Opportunistic infection is the first symptom and this could be managed before the final stage of AIDS manifestation. Within these stages the infected hosts have the ability to spread the virus in a geometrical manner to innocent partners and the possibility of linking sexual networks with respect to geographical locations.

Casual sexual activities are recognised as socio-societal menace, dictating the range and strength of coverage of STIs. Past research has revealed the strength of casual sexual activities among the selected age ranges in the developed nations. Lagos State students are prone to engage in casual sexual activities in order to meet economic needs. The literature has shown that students contribute to the growth of commercial sex activities in some Lagos State Local Governments areas (Ikeja and Surulere).

The survey included pupils who could or who have engaged in casual sexual activities with more than one partner in the last five years and casual sex activities in the Lagos State Schools. The survey established the possibility of respondents living with HIV/AIDS, as the number of pupil engaging in casual sex is close to the number of pupil engaged in sex with more than one partner in the last five years. The survey above is essential for critical consideration as more pupils revealed their multi-sexual activities. This should be a concern to the stakeholders working against HIV/AIDS sexual transmission in Lagos State.

Students having more than five sexual partners could be identified as potential actors of casual sexual activity. It is possible that some pupils that claimed they had one sexual partner; of those who did not answer the question, 411 respondents (42.9%) have had more than one sexual partner in the last five years. Those who did not answer the question are regarded as at risk respondents who may have failed to answer due to shyness but they may still be actively engaged in the activity.

This study advised the stakeholders to increase awareness of casual sexual activity among the Lagos State students as more than half of the population are prone to engage in casual and commercial sex activities.

5.3.3 Respondents behaviour on condoms use

Section C (Question 3) evaluates the use of condoms in the population as a way of avoiding STIs and HIV infection. The use of condoms is a vital component of STIs/STDs prevention strategies and family planning. The use of condoms prevents the contacts of reproductive organs and the anus and mouth in the case of oral sex.

Public health officers have always advocated the use of condoms in the case of casual sex in other to prevent un-wanted pregnancies and the spread of diseases. The use of condoms will positively address the fear of HIV/AIDS transmission among Lagos State students.

Ekanem *et al*. (2005) described the potential actors of sexual networks as irregular partners (or couples) sexual behaviours, sex workers, young female hawkers, schoolgirls, market women within and outside the motor parks. This follows typical trends regarding the spread of diseases within communities. Knowledge of the importance of condom use is likely to break or truncate sexual networks. The use of condoms is classified as a sexual behaviour issue. Availability, quality and cost of condoms are of great concern to public health professionals as these are three driving factors associated with the use of condoms. It is essential to evaluate the use of condoms among Lagos State Students (Appendix III, Table 5.17).

The survey revealed that 457 respondents (47.7%) use condoms while 239 respondents (24.9%) claimed that they do not use condoms during sex and 262 respondents (27.3%) did not provide a response. The two groups (those who said they did not use condoms and those who did not answer) are significant numbers in the population and regarded as potential risk groups. This survey showed the knowledge of respondents regarding the use of condoms as a prevention strategy for STIs/STDs and HIV transmission.

5.3.4 HIV Infection precautions

Section C (Question 4) evaluates respondents' understanding of HIV infection prevention. Chapter 2 discussed the different routes of HIV infection transmission, classified into (i) sexual transmission, (ii) mother-to-child transmission - MTCT and (iii) bloods and blood products (Nasidi and Tekena 2004, Newell and Thorne 2006). Taking precautions against these routes of transmission will reduce the infection rate. The best precautions for the sexual route are avoiding casual sex and the use of condoms.

In order to avoid or reduce MTCTs, infected Mothers should adhere to precautions regarding HIV/AIDS transmission. HIV transmission via infected bloods and blood products are transmitted through unprofessional biomedical practice, the use of infected sharps and intravenous drug use. This survey records Lagos State students' knowledge regarding HIV/AIDS transmission precaution practice as shown in Table 5.18 (Appendix III). The aim of this question is to evaluate respondents' awareness of HIV transmission precautions via the sexual route. 871 respondents (90.9%) responded to the question "What precaution do you take in your private life against HIV infection?"

767 respondents (80.1%) claimed that they do take appropriate precautions in their private life against HIV infection while 104 respondents (10.9%) claimed that they do NOT take vital precautions such as avoidance of casual sex, use of condoms and total abstinence from sex, and 87 respondents (9.1%) did not answer. This is a significant response. More than 10% of the respondents are regarded as an "absolute risk group" including those who did not answer the question.

5.3.5 Evaluating intravenous drug users (IDUs)

Section C (Question 5) evaluates the use of intravenous hard drugs in Lagos State schools. Intravenous Drug Users (IDUs) contribute to global HIV/AIDS transmission and prevalence rates and are classified as a risk factor. IDUs are more pronounced in the developed nations while the state of economy did not encourage use of intravenous drugs in the developing nations due to cost implication. Research showed a clear relationship between commercial sex workers (CSW), sexually transmitted diseases STDs and IDUs (Aral *et al*. 2005).

In most developing nations, prostitution is a source of income for the lower class and more pronounced. There are cheaper oral drugs, smokes and inhalers that are used in both urban and rural communities. It is essential to evaluate IDUs among Lagos State students by asking "Do you use medicine regularly via the parental route e.g. intravenous (using needle and syringe)?" The respondents show distinct and contrary evidence. There is significant evidence that IDUs are noticeable among Lagos State students. Appendix III, Table 5.19 revealed that 829 (86.5%) responded positively to the IDUs question, 240 respondents (25.1%) claimed that they do engage in intravenous drug use while 589 (61.5%) claimed that they do not use intravenous drugs and a significant number of respondents (129) (13.5%) did not answer.

The ratio of respondents that replied "Yes" to "No" is to too high showing that the war against drugs in the Lagos State Schools is not effective as many clearly still use drugs. This is of interest to stakeholders on working HIV/AIDS transmission and the Lagos State Ministry of Education and a concern for the Lagos State communities and public health services (as the survey revealed relationships between youths out

of school (street youths) and youths in school). The study of IDUs should be taken seriously in the Lagos State metropolis for the purpose of HIV/AIDS prevention.

5.3.6 HIV/AIDS patients

Section C (Question 6) establishes the extent that people living with HIV/AIDS (PLWHA) participate in awareness activities as to share their knowledge. There are categories of HIV/AIDS patients according to their adherence to their individual state of health and antiretroviral therapy (HAART). Research shows the categories of patients' health-related performance in accordance of adherence to HAART and belief in the efficacy of therapy with the following patterns:

"(i) believed adherence rates needed to be 90-100% for medication efficacy; (ii) trusted their primary providers greatly; (iii) took medications even when actively using substances of abuse; (iv) were open about their HIV status and received substantial social support; (v) cited staying healthy as their key motivator; (vi) were not actively depressed; all had normal Center for Epidemiologic Studies Depression Scale (CESD) scores" (Malcolm *et al*., 2003).

During the window period of HIV infection (Chapter 2) it is difficult to spot any physical symptoms manifestation. The unique symptom of HIV/AIDS patients is loss of weight with other opportunistic infections such as tuberculosis, rashes and intermittent fevers. Patients on HAART have a high probability of living longer than patients who are not on the therapeutic measure. A depressed patient has no motivation to take medication and to seek social supports.

Lack of public knowledge and attitudes about HIV/AIDS transmission contribute to behavioural issues and stigmatisation. This survey finds it essential to evaluate respondents' knowledge of HIV/AIDS patients. The aim of this survey is to establish the effectiveness of HIV/AIDS patients in HIV/AIDS awareness activities in Lagos State. Of 958 respondents, 366 respondents (38.2%) claimed that they have seen HIV/AIDS patients, 433 respondents (45.2%) claimed they had not and 130 respondents (13.6%) did not answer.

This question is significant as this may apply to other risk groups in the HIV/AIDS network in Lagos State. The participation of HIV/AIDS patients in HIV awareness and education will improve these activities and provide role models for other risk groups. This is a gap that requires attention in Lagos State as many of the HIV/AIDS risk group (students) have not seen HIV/AIDS patients.

5.3.7 Test for HIV stigmatisation

Section C (Question 7) investigates the possible relationship between PLWHA and the respondents as HIV stigmatisation is regarded as anti-social and an economic issue in public health. Stigmatization and discrimination are explored through socio-cultural understandings of illness and disease transmission and its manifestations at societal and individual level (Malcolm *et al.*, 1998). The contexts of discrimination vary according to the investigation from employment, health care systems, school, and places of work, travel and migration. The empirical studies of Adebajo *et al.* (2003) reaffirmed the level of HIV stigmatisation and discrimination in the Lagos State health care sector.

The fear of being identified with the HIV infection often keeps hosts from declaring their HIV status, discussing prevention, changing unsafe behaviour with other risk groups and supporting care for people living with HIV/AIDS (PLWHA). Stigmatisation is still the most important issue that hinders HIV prevention and transmission thus threatening the utilisation and effectiveness of HIV/AIDS prevention and care efforts (Meiberg *et al.* 2008). The aim of this question was to sample the opinion of the respondents on HIV stigmatisation and discrimination. The results to the question, "Would you care and give help to an HIV/AIDS patient?" revealed respondents opinion about HIV/AIDS stigmatisation (Appendix III, Table 5.21).

This is a significant response that shows HIV stigmatisation among Lagos State students. Of 958 respondents answering the question, 706 respondents (73.7%) claimed that they would care and help HIV patients, 105 respondents (11%) said they would not and 147 respondents (15.3%) did not answer. This is an encouraging survey that shows the effectiveness of stakeholders working to combat HIV/AIDS stigmatisation in Lagos State.

5.3.8 People living with HIV/AIDS (PLWHA)

Therapeutic measures and diagnostic activities determine the management of HIV infection and the contribution of HIV/AIDS to the mortality rate. Therapeutic measures have been very effective in the developed nations, as the developmental factors determine the effectiveness of the therapeutic measure in developing nations such as Africa (Stillwaggon, 2002). Distribution logistics, cost, availability and the effectiveness of antiretroviral drugs in the developing nations are not in accordance

with the requirements of therapeutic measures and these determine the responsiveness of the patients to treatment (Hogan *et al.,* 2005).

Clinical trials of antiretroviral drugs are not examined frequently as a result of a lack of an adequate database to record patients' responsiveness. Efficacies of antiretroviral drugs are in question as monitoring and evaluation activities are not effective in the developing nations. All the factors mentioned above makes HIV/AIDS patients vulnerable as solutions for these factors are beyond their capabilities. These call for concern for people living with HIV/AID (PLWHA) and their contribution to the mortality rate. These support the high indices of stigmatisation based on individual perspectives of PLWHA.

Section C (Question 8) samples the respondents' individual feelings towards PLWHA as vulnerable people. This survey established respondents' humanitarian feelings to PLWH as indices of HIV stigmatisation with 958 respondents. The survey revealed that 727 respondents (75.9%) have feelings for PLWHA while 139 respondents (14.5%) said they do not have any feelings and 92 respondents (9.6%) did not answer. This survey is based on individual perspectives and shows the extent of HIV stigmatisation.

There should be an adequate understanding that all PLWHA did NOT contract HIV infection through sexual means and drug use and there should be concern shown towards them. Strengthening efforts to reduce HIV stigmatisation and educate people about transmission could achieve these improvements. The Lagos State AIDS Control Agency (LSACA) should improve clinical trials, particularly their

monitoring and evaluation in other to address the effectiveness of antiretroviral drugs and the mortality rate of PLWHA.

5.3.9 Respondents' behaviours towards PLWHA

Evaluation of HIV stigmatisation and transmission is essential as it shows the association of respondents and the PLWHA. Their association could lead to behavioural challenges and contribute to HIV prevalence in the community. In the context of stigmatisation there should be freedom of association but in public health these challenges have an adverse effect. This requires a definition of association with PLWHA which includes elements of motivation, knowledge and experience sharing in order to address HIV transmission.

In the case of social association with PLWHA and other potential risk groups all HIV transmission precautions should be adhered to. According to Rankin *et al*. (2005), fear of stigmatisation and discrimination could fuel the epidemic, such as a partner not declaring his or her HIV status and pregnant women not going for tests to monitor their pregnancies. It may result in denial of association and may even reduce condom use in HIV discordant couples, so contributing to HIV transmission. Section C (Question 9) deduces the level of association of Lagos State students have with PLWHA as shown in the Table 5.23 (Appendix III).

This questionnaire records the opinion of respondents towards associating with PLWHA. This is a significant outcome that should be noted as stigmatisation and transmission is directly proportional. There were 908 respondents: 862 respondents (90%) revealed that they will relate and associate with PLWHA while 46 respondents

(4.8%) claimed that they will not associate with PLWHA and 50 respondents did not answer the question.

The survey revealed that stigmatisation will be minimal among respondents and PLWHA. It also illustrates the importance of integrating HIV/AIDS education and awareness activities on transmission. It will be essential for Lagos State AIDS Control Agency (LSACA) and other stakeholders working on HIV transmission in order to control the consequence of HIV stigmatisation and transmission in Lagos State Schools.

5.3.10 HIV transmission and fear of stigmatisation

The HIV stigmatisation questions were characterized by factors of avoidance, social fear of abuse and shame. HIV/AIDS-related stigma and discrimination (HASD) and declaration of individual HIV/AIDS status determine the pace of the HIV incidence rate and prevalence. According to Anderson *et al.* (2008), HASD usually occurred where HIV respondents/host had lost trust or were unable to have control over disclosure. This study aims to establish respondents' views about declaring their individual HIV status. Previous sections revealed instances of HASD where a host may not wish to declare his/her HIV status in order to avoid stigmatisation.

People should be encouraged to be tested for HIV frequently and be conscious of sexual activities and activities such as intravenous drugs use, rapes and sexual exchange. Sharing of sharps and cultural practices such as tribal marks and circumcision should be discouraged in order to minimise the HIV incidence rate and transmission. Wife-sharing and widow inheritance should be abolished. All the risk

factors mentioned above contribute to the HIV incidence rate in Nigeria. Schools are a threat to public health by promoting the spread of diseases such as HIV, viral infections (nose-chest), cholera, tuberculosis (TB), small and chicken pox.

Raising awareness of HIV risk factors, opportunistic infections such as sexual transmitted infections and diseases (STIs/STDs) will promote early detections of HIV in official gatherings and schools. Section C (Question 10) asked to indicate the level of transmission and stigmatisation avoidance in Lagos State Schools. The survey question was ("will respondents declare their HIV/AIDS status?") revealed the extent of HIV/AIDS transmission and stigmatisation. This is a significant outcome to Lagos State AIDS Control Agency (LSACA) and other stakeholders working on HIV transmission and stigmatisation.

Table 5.24 (Appendix III) shows the extent of the fear of HIV stigmatisation among Lagos State students and the pace of HIV transmission. 888 respondents (92.7%) responded: 395 respondents (41.2%) said that they will declare their HIV status, 290 respondents (30.3%) said they will not declare their HIV status. 203 respondents (21.2%) said they don't know and they are regarded as a potential risk. Lagos State HIV Stakeholders should intensify their efforts to tackling HIV declaration and the fear of HIV/AIDS-related stigma and discrimination (HASD) in Lagos State.

5.4 Evaluation of HIV counselling and test centres in Lagos State

The World Health Organisation (WHO, 2011) developed a new framework for HIV counselling and test activities to put a new phase to the existing framework as shown in Figure 5.4.

Figure 5.4 WHO latest framework for HCT programme [WHO, 2011]
(http://whqlibdoc.who.int/hq/2011/WHO_HIV_11.01_eng.pdf, Last Accessed: 17/08/2011)

Globally, financial challenges and human incapacity issues have been the factors militating against the quality of services provided by the HCT centres. The standard services provided by the HCT centre are as follows: registration, confidential counselling, HIV testing, receiving results, post-test counselling, post-test clubs for support and referral for therapeutic measures, prevention mother-to-child-transmission (PMTCT) and antiretroviral (ARV) therapy. For simplicity, Section D evaluates the effectiveness and strength of Lagos State HIV Counselling and Testing (HCT) centres through the risk group (Lagos State students) in their respective Local Governments Areas (LGAs) divisions: Badagry, Epe, Ikeja, Ikorodu and Lagos Island. According to the Lagos State AIDS Control Agency (2010) directory of

HIV/AIDS referral services, there are 167 facilities and organisations providing HIV/AIDS related services and 33 providing mobile HCT services. These organisations range from federal, state, local and non-governmental organisation.

Description of Lagos State administrative divisions and respondents' gender

The Badagry Division is located in the western coastal part of Lagos State and forms a border-boundary with the Republic of Benin (West Africa). The Badagry division is highly influenced by West African trans-trade and smuggling activities in groceries, automobiles, human trafficking, petroleum products and clothing. Transportation activities into other West African nations contribute to the spread of HIV/AIDS in the Badagry division of Lagos State. The largest West African electronic products market (Alaba International Market) is situated in Ojo LGA of Badagry division and Lagos State University and Lagos State College of Education main Campuses (Lagos State Ministry of Education, 2011).

The Federal Government Post Graduate College of Medicine, Federal Government College and Adeniran Ogunsanya College of Education are located in Ijanikin of Ojo Local Government Area (LGA). There are many periodic local (rural) markets which operate at five days intervals. These aid the convergence of rural and urban people, such as Ikoga Market, Badagry Market, Ajara Market, Ijanikin Market, Mowo Markets, Iworo-Ajido Market and Ojo Market (Lagos State Ministry of Commerce, 2011). Lagos State also operates a centralised wholesale automobile market located at Ajeromi-Ifelodun LGA in Badagry division. It attracts over three million people in a week from other states of the federation and West African countries. The Lagos

State Trade Fair Centre is situated along the Lagos-Badagry Expressway, in Ajeromi-Ifelodun LGA. It attracts over fifteen million people annually.

The Lagos State AIDS Control Agency (LSACA) recognised that all these activities are factors contributing to the HIV prevalence in Badagry division. In addition, a traditional birth operational system is pronounced in the Badagry division of Lagos State. Balogun and Odeyemi (2010) identified traditional birth attendants (TBAs) as contributing to high levels of HIV prevalence and mother-to-child transmission (MTCT) in the Badagry division. This survey evaluates the effectiveness of HIV counselling and test centres (HCT) in the Badagry division using 164 respondents, as shown in Table 5.25(a) Appendix III, 57 respondents (34.8%) are male, while 106 respondents (64.6%) are female.

Epe division is categorised as a rural area with various types of settlement such as liner, disperse and concentric (Adeyemi, 2007). The Epe division shares a boundary with Ogun State and creeks. The inhabitants occupy themselves with some farming, although fishing is their major occupation. The Lagos State Government established the satellite campus of Lagos State University (Faculty of Engineering) and Lagos State College of Primary Education, including Lagos State Technical College in order to put a developmental phase into the region (Lagos State Ministry of Education, 2011). Poverty in the region means there is low purchasing power, high unemployment, high mortality rate, low life expectancy and insufficient access to social amenities (Lagos State Ministry of Women affairs and Poverty Alleviation, 2011).

The convergence of students from other parts of Lagos State contributes to the HIV transmission and prevalence in the Epe division. This is due to students' activities such as cultism, sexual networks, rape and drugs (Oloko and Omoboye, 1993). These students' activities require attention in order to address HIV/AIDS infection rate in Epe division. Table 5.25 (b), Appendix III, shows the number of students involved in the survey; 85 respondents (54.1%) are male, while 71 respondents (45.2%) are female.

The Ikeja division is the largest, most developed, and most populated division. It shares a boundary with Ogun State in the Ifako-Ijaye local government area (LGA). All the local government areas under Ikeja division are categorised as urban (Adeyemi, 2007). The Ikeja division is a centre with the seat of Government administration, factories and commercial activities of Lagos State. The Ikeja division has the highest number of secondary schools in Lagos State. Overnight and street night markets are common in all locations of the Ikeja division such as Oshodi, Ikeja (Ogba Ijaye), Agege (Pen Cinema), Alimosho (Iyana Ipaja) and Ifako-Ijaye (Abule-Egba).

Intra State, inter States and international (West Africa countries) commuters' transportations are pronounced in Ikeja division. These factors make a positive impact on HIV/AIDS transmission and prevalence; activities such as prostitution and drug use are pronounced. Respondents who participated in the survey was apportioned as follows: 177 respondents (47.3%, male), 197 respondents (52.7%, female).

The Ikorodu division is categorised as a semi-urban area (Adeyemi, 2007) and shares a boundary with Isagamu (Ogun State area), Ikeja and Epe division. The Ikorodu division is influenced by the activities in Ikeja division and partly by Epe. Traditional birth attendants (TBA) are prominent in Ikorodu division as in Badagry division. The Lagos State Polytechnic campus is situated in Ikorodu LGA; it aids the convergence of students and promotes activities such as cultism, drugs and prostitution. Night markets, street hawking and child abuse are common in Ikorodu division. The relationship between the transporters and rural market women are cordial. This promotes fornication, adultery and extra-marital affairs (Ekanem *et al*., 2005).

Cultural practices and norms such as tribal marks, male circumcision and secret cult activities (fraternity) occur in the rural areas of the Ikorodu division. These activities promote HIV/AIDS transmission and prevalence in the Ikorodu division. 35 respondents (32.7%) are male, while 72 respondents (67.3%) are female.

Lagos Island division is categorised as an urban centre and houses the administrative headquarters for banks and financial institutions, companies, foreign embassies and commercial activities. Night clubs and bar beach activities are common in Lagos Island division. They support the promotion of sexual networks (rape and casual sex) and drugs. The University of Lagos, Federal College of Technology, Federal Technical College and Lagos State School of Nursing are situated in the Lagos Island division. These institutions encourage students' activities such as casual sex, rape, drugs and cultism, as mentioned in the Ikorodu division of Lagos State. Commercial

sex workers (CSW) are common in Surelere LGA of Lagos Island division (Oyefara *et al*., 2007; Ogunjuyigbe and Adeyemi, 2005).

The Balogun Market of Lagos Island LGA is a busy daily market as it attracts more than two million people every day from both within the state and outside (Lagos State Ministry of Commerce, 2011). The Lagos Sea port is situated at Apapa LGA of Lagos Island division. It is a busy arena for the sailors with social activities such as night theatre, films, dance shows and bars. These activities contribute to the challenges facing the transmission of HIV/AIDS in the Lagos Island division of Lagos State. 62 of respondents (45.6%) are male, while 74 respondents (54.4%) are female.

Non-Lagos State respondents are students that have the potential to spread HIV/AIDS in their states of residence and their source and social characteristics are unclear in the survey. This survey recognised them as stakeholders in the risk factors network which includes rape, STIs/STDs, drugs, CSW and cultural practices (see Appendix III, Table 5.25f). Of the respondents, 5 respondents (25%) are male, while 15 respondents (75%) are female. These are very high risk groups and they are unable to be linked with their state of residence. Their levels of risk to the Lagos State metropolis cannot be judged as their behaviour out of school hours are not known. They pose a great challenge to the stakeholders in the HIV/AIDS network in Lagos State.

5.4.1 Awareness of HIV test in Lagos State divisions

Promoting of awareness of HIV test is the foremost function of HIV counselling test centres. Section D (Question 1) establishes the extent of HIV test awareness in the Lagos State division and the values of capacity builders working on individual motivation for HIV testing. According to Balogun and Odeyemi (2010), there is less awareness for HIV testing among the traditional birth attendants (TBAs) in the rural areas of Lagos State and this contributes to mother-to-child transmission. An HIV mobile test is required at all strategic locations of Lagos State divisions stated above.

This research shows the effectiveness of HIV counselling and test centres in Badagry division and has a significant outcome (Appendix III, Table 5.26a). 159 respondents (97%) took part and 43 respondents (26.2%) revealed that they tested for HIV within the previous two years, while 116 respondents (70.7%) said they have not been not tested. This response confirms the weakness of HIV counselling centres in the Badagry division of Lagos State. In Epe division, Appendix III (Table 5.26b), 157 respondents participated and 155 (98.7%) stated their view towards HIV testing. 17 respondents (10.8%) claimed they were tested, while 138 respondents (87.9%) declared that they had not been tested in the last two years. This is a significant disparity between tested respondents and not tested respondents.

Ikeja division is the busiest division in Lagos State (see Section 5.4.0). The study evaluates the extent of HIV test awareness in the Ikeja division through a selected risk group (students). When considering respondents' awareness of HIV testing (see Appendix III, Table 5.26c), 374 respondents participated from the Ikeja division. 367 respondents (98.1%) stated that they were aware of HIV testing. 159 respondents

(42.5%) confirmed that they had a HIV test in the last two years, while 208 respondents (55.6%) had not been tested for HIV/AIDS in the last two years.

The attributes of HIV/AIDS risk groups in Ikorodu division (Section 5.4.0) necessitates HIV/AIDS test awareness for residents and other recognised actors. The study establishes the state of HIV test awareness in the Ikorodu division which included 107 respondents of whom 106 respondents (99.1%) declared their awareness of HIV testing (see Appendix III, Table 5.26d). 16 respondents (15%) declared that they had taken an HIV test within the last two years while 90 respondents (84.1%) declared that they had not been tested for HIV/AIDS in the last two years.

Lagos Island division is associated with particular HIV/AIDS risk factors (see Section 5.4.0). This survey evaluates HIV test awareness among the students of Lagos Island division (see Appendix III, Table 5.26e). The survey involved 136 respondents; 128 respondents (94.1%) were aware of HIV testing. 44 respondents (32.4%) revealed that they had been tested for HIV, while 84 respondents (61.8%) had not been tested for HIV in the last two years. This shows a low level of awareness of HIV/AIDS testing in the Lagos State.

5.4.2 HIV counselling and testing centres in Lagos State metropolis

This survey establishes the level of awareness of HIV counselling and testing centres that are available to people in Lagos State. Lagos State HIV centres provide services that range from counselling people living with HIV/AIDS (PLWHA) to educating

pregnant women and sex workers about transmission and HIV testing and other services recognised by the WHO (see Section 5.4.0).

Section D (Question 2) investigates the level of awareness of HIV counselling and testing centres (HCT) in Lagos State (see Appendix III, Table 5.27a). Badagry division shows a significant finding and 154 respondents (93.9%) were asked if they were aware of the HIV counselling and testing centre (HCT). 57 respondents (34.8%) said they were aware of the existence of HCT centres in the Badagry division, while 97 respondents (59.1%) declared that they were not aware of HCT centres.

The Epe division survey confirmed the level of awareness of the HCT centre. 157 respondents took part in the survey and 156 respondents (99.4%) stated that they were aware of the HCT centre in their respective domains. Appendix III (Table 5.27b) shows that 43 respondents (27.4%) were aware of HCT centre(s) in their areas while 113 respondents (72%) were not aware of any HCT centre in the localities.

Appendix III (Table 5.27c) revealed states of awareness of HCT centres in Ikeja division. 362 respondents (96.8%) confirmed that they were aware of the HCT centres in the respective domains. 164 respondents (43.9%) are aware of the HCT centre in their areas while 198 respondents (52.9%) are not aware of the HCT centre in their respective localities.

For awareness of HIV centre in Ikorodu division, (Appendix III, Table 5.27(d) 107 respondents took part in the survey and 103 respondents (96.3%) declared that they were aware of the HCT centre in their respective locations. The survey revealed 33

respondents (30.8%) are aware of the HCT centre in their respective area, while 70 respondents (65.4%) claimed that they are not aware of any HCT centre in their respective areas.

The Lagos Island Division survey, see Appendix III, Table 5.27e, included 136 respondents from the Lagos Island, of whom 127 respondents (93.4%) declared that they were aware of HCT centres, while 57 respondents (41.9%) revealed that they are aware of HCT centres in the Lagos Island division and 70 respondents (51.5%) are aware of HCT centres in their respective locations. This is a significant outcome that revealed a low awareness of HCT centres in the Lagos State, and the requirement for stakeholders to raise awareness.

5.4.3 Respondents' behaviour towards HCT centres in Lagos State

Section D (Question 3) establishes respondents' behaviour towards HCT centres in the Lagos State metropolis. This research samples respondents' views about HCT activities and the effectiveness of information and educational communication (IEC) in the Lagos State divisions. The survey asked respondents if they had checked their individual HIV/AIDS status at the HCT centre within the division or outside.

Of 164 respondents from Badagry division towards HCT centres (see Appendix III, Table 5.28a), 154 respondents (93.9%) stated their willingness to have a HIV/AIDS test and use the HCT centres in their respective domain. The survey revealed that 127 respondents (77.4%) said they would be willing to have a HIV/AIDS test if asked, while 27 respondents (16.5%) said they would not. Of 157 respondents from the Epe division (see Appendix III, Table 5.28b), 155 respondents (98.7%) consented

to have an HIV test and participate in the other activities of the HCT centres. It was revealed that 74 respondents (47.1%) consented to HIV testing and the use of HCT centres in their respective localities, while 81 respondents (51.6%) said no.

Of 374 respondents from the Ikeja division (see Appendix III, Table 5.28c), 362 respondents (96.8%) revealed their views regarding HIV testing and HCT activities in the Ikeja division. The outcome shows that 317 respondents (84.8%) consented for HIV testing and HCT activities, while 45 respondents (12%) said no. The survey recorded respondents' behavioural change towards HCT centres in the Ikorodu division (see Appendix III, Table 5.28d). 107 respondents from the division participated and 104 respondents (97.2%) responded to the survey. It shows that 89 respondents (83.2%) agreed to have a HIV test while 15 respondents (14%) were not willing to do this.

Appendix III (Table 5.28e) included 136 respondents from the Lagos Island division and 127 respondents (93.4%) consented to answer the question. It revealed that 112 respondents (82.4%) consented to having a HIV test while 15 respondents said no. Lagos State stakeholders working on Information and Education communication (IEC) and Behavioural Communication Change (BCC) should put more emphasis on raising awareness of the HCT centres in order to change people's perspectives towards HCT centres.

5.4.4 HIV/AIDS behavioural lectures/lessons in Lagos State

The recognised objectives of HIV/AIDS BCC are to: increase HIV knowledge, promote essential attitudinal change, reduce HIV/AIDS stigma and discrimination,

create demand for HIV information and services, be an advocate on HIV/AIDS issues and improve community skills on HIV/AID prevention strategies. Section D (Question 4) evaluates the effectiveness of HIV counselling and test centres in Lagos State through the use of regular workshops, seminars, symposia, lectures and talks on BCC and the use of Behavioural Communication Information (BCI) materials.

Regarding the activities related to HIV BCC/BCI in the administrative divisions of Lagos State (164 respondents from the Badagry division), 156 respondents (95.1%) stated that they had experienced BCC/BCI (see Appendix III, Table 5.29a). The survey revealed that 126 respondents (76.8%) had experienced HIV/AIDS BCC/BCI activities in the Badagry division, while 30 respondents (18.3%) said they had not been given a lecture or lesson on HIV/AIDS BCC/BCI.

In Epe division, 152 respondents answered the question about HIV/AIDS BCC/BCI in Epe division (see Appendix III, Table 5.29b). 100 respondents (63.7%) confirmed that they had recently been given lectures or lessons on HIV/AIDS while 52 respondents (33.1%) said they had not.

Ikeja division included 374 respondents and 367 respondents (98.1%) answered the question (see Appendix III, Table 5.29c). The survey revealed that 331 respondents (88.5%) said that they have been given a lecture or lesson on HIV/AIDS in their respective locality, while 36 respondents said that they had not. Of 107 respondents from the Ikorodu division (see Appendix III, Table 5.29d), 105 (98.1%) answered a question about lectures and lessons on HIV/AIDS BCC/BCI within the domain. The survey showed that 88 respondents (82.2%) confirmed that they been given a lecture

or lesson on HIV/AIDS BCC/BCI while 15 respondents (14%) said they had not and 4 respondents (3.7%) did not respond.

Of 136 respondents from Lagos Island, 129 respondents (94.9%) answered a question about HIV/AIDS BCC/BCI lectures or lessons within the division (see Appendix III, Table 5.29e). The survey revealed the effectiveness of HCT centres in Lagos Island on HIV/AIDS BCC/BCI activities. 104 respondents (76.5%) confirmed that they had lectures or lessons on HIV/AIDS BCC/BCI while 25 respondents (18.4%) said they had not. Whilst this is a significant response, the situation could be further improved by utilising the available HCT centres to its full capacity.

5.4.5 Respondents evaluation on HIV/AIDS BCC/BCI

Section D (Question 5) samples respondents' understanding of HIV/AIDS BCC/BCI networks in order to evaluate the HIV communication channel (HCC) following a HIV positive result from the test. Respondents were asked, "Who would you inform if you are HIV-positive?" This question tests the strength of stigma among the respondents and aims to test the communication channel for the empowerment of HIV/AIDS BCC/BCI. This is to support the communication channel(s) involved the activities of Lagos State HCT centres and address HIV-transmission and the fear of stigma among the selected risk group (young students).

The identified HIV/AIDS communication channels are taken into consideration in the survey: spouse, hospital staff (biomedical staff), teacher/lecturer, lover, sibling, parent and friends. The pie chart (Figure 5.5 below) shows the strength of Lagos State students' HIV communication channels.

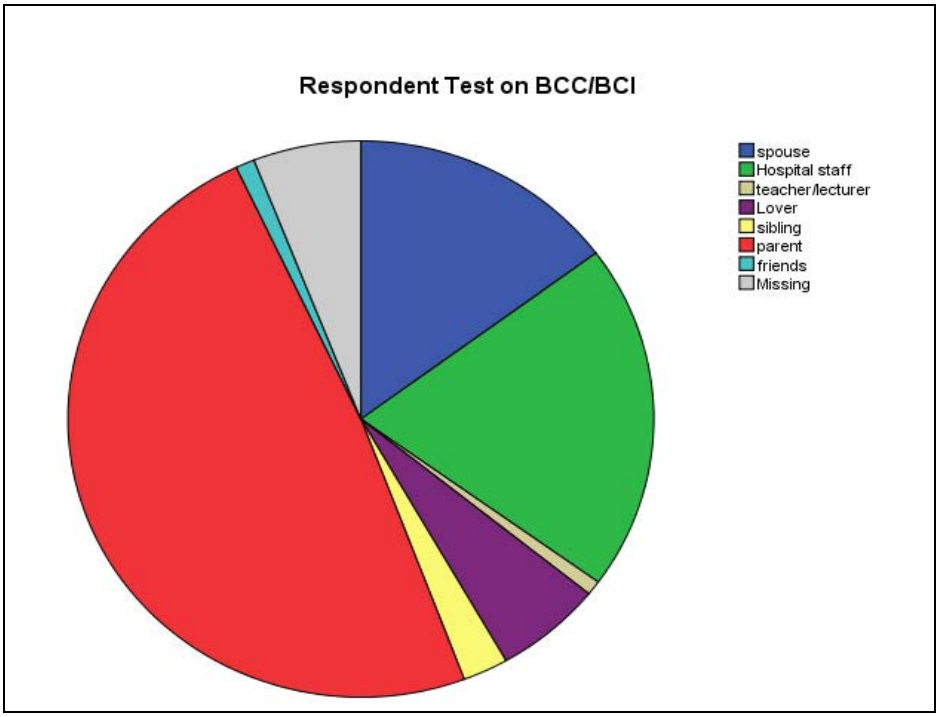


Figure 5.5 Lagos State students HIV communication channels

Of 958 respondents, 901 respondents (94.1%) identified the following as HIV-positive communication channels among Lagos State students: spouse (142, 14.8%), hospital staff (193, 20.1%), lover (57, 5.9%) and parents (467, 48.7%). This is a significant suggestion that should encourage parents and partners (spouses) Lagos State in tackling HIV transmission, prevention, stigmatisation and therapeutic activities.

5.4.6 HIV/AIDS information, education and communication (IEC) in Lagos State

Section D (Question 6) evaluates the effectiveness of HIV/AIDS Information, education and communication (IEC) activities in Lagos State through the selected risk group (students). Diverse IEC activities for HIV/AIDS address issues of behaviours, awareness and preventive measures such as the use of condoms, avoidance of casual sex, the use of untreated sharps and extra-marital affairs.

The survey evaluates respondents' views on the frequency of HIV/AIDS adverts in the media such as television, radio and bill boards in the Lagos State metropolis. Of respondents in the Lagos State metropolis, 958 respondents took part in the survey with 917 respondents (95.7%) answering the question about their observations of HIV IEC (see Appendix III, Table 5.31). This is significant outcome for the stakeholders working on HIV/AIDS IEC in Lagos State metropolis. 659 respondents (68.8%) declared that HIV/IEC is very common, 172 respondents (18%) thought it was fairly common, while 86 respondents (9%) said that HIV/AIDS IEC is not common in the Lagos State metropolis. An effective HIV/AIDS IEC in Lagos State could address the behavioural challenges and have a positive impact on HIV-transmission rate and prevalence.

5.5 Global system for mobile (GSM) communication

Section E of the questionnaire investigates use of mobile phone among the selected risk group. Global System for Mobile (GSM) communication networks were introduced into Nigerian telecommunication system in September, 2001 by the National Communication Commission's (NCC) licensed communication providers: Econet (Zain), Nitel and MTN (Idowu *et al*. 2003). This has been a breakthrough for the mobile phone providers and GSM has spread city-to-city and state-to-state.

In 2001, the Federal Government of Nigeria (FGN) established the National Information Development Agency (NITDA) to bridge the application of GMS to its optimum usage in Nigeria. Later in 2003, more GSM providers such as Etisalat, Globacom, and Multilinks entered to compete in the Nigerian communication

market and rapidly expanded to cover more rural areas of the federation. In the near future, all areas will be efficiently covered.

GSM operations are highly competitive in the Lagos State metropolis and have added value to activities such as transportation and commerce. GSM operations have improved the quality of service and integration of data sharing via the internet and adverts. This empirical research aimed to introduce electronic-learning (e-learning) and mobile computing (devices) into HIV/AIDS activities in Lagos State as part of mobile-learning (m-learning) for Knowledge Management (KM) to address behavioural challenges and enhance HCT activities regarding HIV information, education and communication. Boyinbode and Akinyed (2008) stated that "*Mobile-learning is the combination of mobile technologies and appropriate pedagogy to allow learners to interact with learning environments, and other learners, at any time from any location*".

Hence, the evaluation of the use of mobile phones in the Lagos State health sector is essential. There is the possibility of introducing GSM phone applications to the Lagos State HIV/AIDS activities to improve the quality of services provided to people living with HIV/AIDS (PLWHA) and other risk groups. This would also to improve HIV therapeutic activities, monitor HIV incidence rate through central database operations, tackle HIV transmission, prevention, counselling, testing and other awareness activities.

5.5.1 Types of phone used among Lagos State students

This research found that various types of phones are used among the selected risk group (students). Landline phones service providers are competing in the Nigerian telecommunication sector and the service provided to the subscribers but they lack short messaging service (SMS) text and multimedia messaging service (mms) applications. The landline phone service concentrated on the population-based coverage. The services are limited to the cities and some towns. Mobile phone applications could be used to address issues in healthcare and information management system in HIV/AIDS activities in the Lagos State.

Section E (Question 1) investigates the use of phones among the respondents and established the usage on divisional bases (Lagos State divisions). Table 5.32 (see Appendix III) shows the use of phones in Lagos State, this included 958 respondents and 909 respondents (94.9%) stated that they had a phone. The survey revealed 80 respondents (8.4%) use landline phones and 829 respondents (86.5%) use mobile phones. This is a significant outcome and suggests that mobile phone applications can be introduced into healthcare. This survey showed that mobile phone use is more common among Lagos State students than landline phone use. It also revealed that mobile phone applications can be introduced to Healthcare Behavioural Change Communication (BCC) and Information, Education and Information (IEC) activities in Lagos State, to address HIV/AIDS prevention, transmission and improve therapeutic measures.

Mobile phone applications can be used as an information and knowledge transfer device to HIV/AIDS activities in Lagos State. This is to support Healthcare

information management system (HIMS) and introduce e-health. These make Knowledge Management (KM) and transformation easier and assist biomedical professionals who are working in isolation (without the aid of healthcare databases). HIV counselling and testing (HCT) centres will be able base their activities on individual mobile phone numbers which will make monitoring, evaluation and therapeutic activities easier.

5.5.2 Evaluating the use of short messaging services (SMS)

This research aims to establish the use of phone technology as a new frontier in HIV/AIDS activities that will be able to address the limitations and challenges facing HIV counselling, testing and therapeutic measures. Adoption of mobile phone technologies into HIV counselling and testing activities will positively increase their efficiency and improve access to good quality healthcare services. The last section (5.5.1) established the use of mobile phones among the risk group and the society as a whole. HIV/AIDS Behavioural Change Communication (BCC) and Information, Education and Communication (IEC) activities can be established on SMS in conjunction with mobile phone service providers and could include awareness of condom use and untreated sharps.

The use of mobile phone technology for services that includes free text messaging and calls for patient management and information systems will bring about a centralised health care information management system (healthcare database) to aid the efficiency of the biomedical professionals and help healthcare professionals working in isolation. The use of mobile phones to access information in Nigeria is relatively cheaper, easier and more popular than in South Africa, particularly with

the rural settlers (Kazanka and Dada, 2009). The communications gap between people living with HIV/AIDS (PLWHA) and the biomedical staff on therapeutic activities can be bridged by the use of mobile technology (SMS) to update a centralised database for antiretroviral clinical trials.

Section E (Question 2) evaluates the use of SMS among the selected risk group and the use of mobile phone technology in Lagos State. Respondents were asked, "Do you send and receive text on your phone?". Regarding the use of SMS among the selected risk groups (Lagos State students), of 958 respondents, 912 (95.2%) used mobile phone technology (sending and receiving text messages). The survey results were as follows: 831 respondents (86.7%) said they often used to communicate, 81 respondents (8.5%) were not keen on using SMS to communicate (see Appendix III, Table 5.33). This is a significant outcome and shows that SMS telephone services could be introduced to Lagos State health care to improve the quality of services provided to the metropolis.

5.5.3 Mobile phone networks coverage and efficiency in Lagos State

The current state of GSM mobile communication in Nigeria has bridged the gap of limitations and coverage with a competitive lucrative telecommunication market. The literature revealed that Nigerian GSM subscribers moved to better and more efficient networks (Wills and Daniels, 2003; and Obadare, 2005). The GSM coverage and efficiency will assist with the adoption of mobile phone technologies as the introduction of Knowledge Management (KM) tools into public health activities will minimise cost, time and efficiency.

Section E (Question 3) established an evidence-base of mobile phone network coverage and efficiency in Lagos State through the responses given in the survey. Respondents were asked, "Which networks do you subscribed to such as MTN, Glo etc". 937 respondents (97.8%) declared their GSM network as follows: MTN (374) (39%), Zain (234) (24.4%) and Glo (147) (15.3%) – see Appendix III, Table 5.34. Etisalat and Visaphone are GSM communication providers, Multilinks and Starcomms are landline communication providers while 72 respondents (7.5%) have "no network". Statistically, this question could be significant to Lagos State stakeholder working on HIV/AIDS activities as it will help decide which network(s) adopt in cause of framework implementation.

5.5.4 Evaluating use of mobile phones for HIV/AIDS activities

The survey evaluates the use of mobile phone technology for HIV/AIDS activities in Lagos State in order to establish if such approach has been in existence in Lagos State healthcare. The healthcare information system (HIS) can be efficiently managed as this research has revealed the significant use of mobile phone technology among the risk group. The use of mobile phone technology (texting) confirmed that the risk group is used to information sharing and this same principle can be introduced to HIV/AIDS information and knowledge sharing, including diseases such as STIs/STDs.

Adoption of a responsive short text messaging service could address the issue of cost and time to reach a targeted audience regarding HIV risk factors awareness. This will provide feed-back from the risk groups and efficient monitoring and evaluation, rather than the current unidirectional HIV/AIDS communication system.

Eradication of HIV/AIDS stigmatisation and discrimination could be addressed through adoption of mobile phone technology (SMS).

Section E (Question 4) verified and established the use of mobile phone technology (SMS) on HIV/AIDS activities from the respondents by asking "have you ever received text(s) on your phone regarding HIV/AIDS from any organisation or establishment?" Of 958 respondents, 904 (94.4%) responded as follows: 237 respondents (24.7%) confirmed that they have received a text on their mobile phone from HIV/AIDS stakeholders, while 667 respondents (69.6%) said they had not (see Appendix III, Table 5.35) . This survey demonstrates a simple approach to the introduction of knowledge sharing as a principle of Knowledge Management (KM). The introduction of mobile Phone technologies (SMS and call) to HIV/AIDS activities in Lagos State will increase the scope of stakeholders and raise awareness.

5.6 Correlation analysis

Correlation analysis is an inferential statistical technique used to show how pairs of variables are related (Pallant, 2010). There are different methods adopted in correlation analysis, depending on the nature of data. The study examined relationships between independent and dependent variables to determine statistical association. The nature of the data (categorical) meant that a non-parametric technique (Chi-Square test) was required to determine the level of association (*p*-value) and strength of linear relationship (r) between pairs of variables. Figure 5.6 presents summary of the Chi-Square test

Variables	Transmission Awareness	STIs Clinical Knowledge	Condom Usage	HIV Stigmatisation	HIV Testing Awareness
Gender	r = 0.13 *p* = 0.001	r = 0.06 *p* = 0.24	r = 0.24 *p* = 0.001	r = 0.06 *p* = 0.22	r = 0.05 *p* = 0.10
Age Groups	r = 0.27 *p* = 0.001	r = 0.31 *p* = 0.001	r = 0.18 *p* = 0.001	r = 0.10 *p* = 0.507	r = 0.43 *p* = 0.001
Marital Status	r = 0.02 *p* = 0.829	r = 0.14 *p* = 0.001	r = 0.18 *p* = 0.001	r = 0.016 *p* = 0.894	r = -0.28 *p* = 0.001
Religion	r = 0.12 *p* = 0.002	r = 0.14 *p* = 0.001	r = 0.20 *p* = 0.001	r = 0.08 *p* = 0.185	r = 0.09 *p* = 0.007
Educational Class	r = 0.20 *p* = 0.001	r = 0.32 *p* = 0.001	r = 0.17 *p* = 0.001	r = 0.13 *p* = 0.02	r = 0.44 *p* = 0.001

*r = Correlation co-efficient, *p* = (*p* – value)

Figure 5.6 Chi-square test summary

5.6.1 Respondents gender and chi-square test

Gender and awareness of HIV-transmission

The relationship between respondents' gender and understanding of HIV-transmission was investigated using a Chi-Square test. The analysis revealed *r = 0.13, N = 937, p = 0.001 (p < 0.05)*. The two variables (gender and understanding of HIV transmission) are statistically associated.

Gender and STIs clinical knowledge

The association between respondents' gender and knowledge of sexually transmitted infections was investigated using the Chi-Square test. The analysis revealed no association as follows: *r = 0.06, N = 909, p = 0.24* (not significance - null hypothesis as p-value is greater than the traditional statistical significance $p > 0.05$).

Gender and use of condoms

The relationship between respondents' gender and use of condoms during sex was tested using a Chi-Square test. The analysis revealed the level of association (significance) as follows: $r = 0.24$, $N = 956$, $p = 0.001$ ($p < 0.05$). A significant number of respondents used condoms. They were male (256) and female (200). The number of respondents who stated that they do not use condoms are: female (90) and male (149). The state of awareness of female condoms in the developing nation (Nigeria) and family planning programme (contraceptive use) might account for the response.

Gender and fear of HIV stigmatisation

The relationship between gender and fear of HIV stigmatisation was investigated using Chi-Square test. The analysis revealed no association as follows: $r = 0.06$, $N=886$, $p = 0.22$, $p > 0.05$ (not significance – null hypothesis). Although fear of stigmatisation is identified as a factor associated with HIV-transmission, it is not significantly associated with gender in this research.

Gender and awareness of HIV-testing

The association between respondents' gender and awareness of HIV-testing was investigated using a Chi-Square test. The analysis revealed no association: $r = 0.05$, $N = 933$, $p = 0.10$ ($p > 0.05$). (not significance - null hypothesis as p-value is greater than the traditional statistical significance $p>0.05$). The lack of awareness of HIV Counselling and Testing (HCT) centres or inefficiencies could explain this result.

5.6.2 Respondents' age groups and chi-square test

Respondents' age groups and HIV transmission understanding

The relationship between respondents' age groups and HIV transmission understanding was test using a Chi-Square test. The analysis revealed the level of significance as follows: $r = 0.27$, $N = 927$, $p = 0.001$ ($p < 0.05$). To compare the age groups, the youngest group (15-16) (200) and those aged 17-18 (127) show a lower level of understanding about HIV transmission when compared to the age group 25 and above (109). The respondents' individual age, social exposure and proximity to HIV/AIDS educational programmes could be factors causing this difference.

Respondents' age groups and STIs clinical knowledge

The association between respondents' age groups and STIs clinical knowledge was investigated using a Chi-Square test. The analysis revealed a level of association (significance): $r = 0.31$, $N = 898$, $p = 0.001$ ($p < 0.05$). Statistically, the age group 25 and above (194) showed a better understanding of STIs clinical knowledge than the other age groups and significantly more than the age group 15-16, where 117 respondents are not sure if STIs can be cured. This is concerning as the age group 15-16 appears to be vulnerable to STIs transmission.

Respondents' age groups and use of condoms

The relationship between respondents' age groups and use of condoms was considered using a Chi-Square test. The analysis revealed a level of significance: $r = 0.18$, $N = 945$, $p = 0.001$ ($p < 0.05$). The age groups, 15-16 (131); 17-18 (99); 23-24 (61), and 25 and above. 126 respondents declared that they use condoms during

penetrative or oral sex. A significant number of respondents said no and some did not respond in age groups 15-16, 17-18, 23-24, and 25 and above. There appears to be a discrepancy and respondents might be engaging in unsafe sexual activities.

Respondents' age groups and fear of HIV stigmatisation

The relationship between respondents' age groups and fear of HIV stigmatisation was investigated using a Chi-Square test. The investigation revealed no there to be no association: $r = 0.10, N = 876, p = 0.507$ (no association as $p > 0.05$ – null hypothesis). Fear of stigmatisation could reveal the level trust between the risk groups and stakeholders (LSACA network). Consideration of the table shows that none of the age groups are significantly associated with the fear of stigmatisation.

Respondents' age group and HIV-test awareness

The association between respondents' age groups and HIV-test awareness was investigated using a Chi-Square test. The analysis revealed a significance relationship $r = 0.43, N = 922, p = 0.001$ (the two variables are associated as $p < 0.05$). The age groups 15-16 (278), 17-18 (165) and 19-20 (18) show less awareness of HIV-testing compared to the age group 25 and above (109). The analysis revealed the age groups 15-16 and 17-18 to be potential risk groups as they lack HIV-test awareness. The variation of Lagos State HIV counselling and testing (HCT) activities could be responsible for the variation in awareness of HIV-testing in individual Lagos State administrative locations.

5.6.3 Respondents' marital status and chi-square test

Respondents' Marital Status and HIV Transmission Understanding

The relationship between respondents' marital status and HIV transmission understanding was investigated using a Chi-Square test. The analysis revealed no level of significance $r = 0.02$, $N = 911$, $p = 0.829$ ($p > 0.05$) – null hypothesis. Significant numbers of single respondents (449) show a lack of HIV transmission understanding.

Respondents' marital status and STIs clinical knowledge

The relationship between respondents' marital status and STIs knowledge was investigated using a Chi-Square test. The investigation revealed a significant relationship $r = 0.14$, $N = 884$, $p = 0.001$ ($p < 0.05$). A significant number of single respondents (229) are not sure if STIs can be treated while married respondents statistically show a better understanding of STIs treatment.

Respondents' marital status and use of condoms

The relationship between respondents' marital status and use of condoms was analysed using a Chi-Square test. The analysis revealed a significant relationship: $r = 0.18$, $N = 928$, $p = 0.001$ ($p<0.05$). A significant numbers of single respondents (401) stated that they use condoms during sexual activities while a considerable number of single respondents (182) said they did not. Married respondents may decide not to use condoms as result of marital vows and contraceptive use. A significant number of single respondents (239) did not answer and may be vulnerable to HIV-transmission.

Respondents' marital status and fear of HIV stigmatisation

The association between respondents' marital status and fear of HIV stigmatisation was tested using Chi-Square test. The test revealed no level of significance as $r = 0.016$, $N = 859$, $p = 0.894$ ($p > 0.05$) (no association) – null hypothesis. The relationship between respondents' marital status and fear of stigmatisation is statistically insignificant. Fear of HIV stigmatisation should not be undermined in HIV transmission as a significant number of single respondents (251) said they would not or might not declare their HIV status if positive and 175 single respondents refused to contribute.

Respondents' marital status and HIV-test awareness

The relationship between respondents' marital status and HIV-test awareness was tested using a using Chi-Square test. The analysis revealed a level of significance $r = -0.28$, $N = 905$, $p = 0.001$ ($p < 0.05$). The survey revealed the state of HIV-test awareness in Lagos State; 211 single and 68 married respondents were aware of the importance of HIV-testing compared with 592 singles and 34 married respondents who were not tested. Singles respondents may not consider the HIV-test to be as important as married respondents as revealed in table.

5.6.4 Respondents' religion and chi-square test

Respondents' religion and HIV transmission understanding

The relationship between respondents' religion and HIV transmission understanding was tested using a Chi-Square test. The analysis revealed a level of significance $r = 0.12, N = 930, p = 0.002 (p < 0.05)$. 398 respondents (Christian: 77.6% and Muslim: 22.4%) showed a significantly better understanding of HIV transmission compared to 519 respondents (Christians: 68% and Muslim: 32%). Statistically, both groups show a low level of knowledge of HIV transmission.

Respondents' religion and STIs clinical knowledge

The relationship between respondents' religion and STIs was evaluated using a Chi-Square test, which showed r = 0.14, N = 901, p = 0.001 (p < 0.05). The analysis showed a significant relationship, as more respondents 554 (Christian: 76.7% and Muslim: 23.3%) showed knowledge of STIs compared with 99 respondents (Christians: 58.6% and Muslim: 41.4%). The concern is that respondents from both religions 248 (Christian: 66.5% and Muslim: 33.5%) are not sure if STIs can be treated and they are at risk of contracting HIV.

Respondents' religion and use of condoms

The study evaluates respondents' religion and use of condoms. A Chi-Square test was carried out and showed: $r = 0.20, N = 948, p = 0.001 (p < 0.05)$. The analysis showed a level of significance. More respondents (451 of whom 64.7% were Christian, and 35.3% were Muslim) stated that they used condoms during casual sex compared with 236 respondents (Christians: 72% and Muslim: 28%). The concern is

that the ratio of the respondents is 1:2 approximately; 261 did not answer the question (Christian: 83.9%; Muslim: 16.1%). The analysis suggested that Christians engage in more unprotected sex than Muslims.

Respondents' religion and fear of stigmatisation

The study evaluates the relationship between respondents' religion and their fear of stigmatisation using a Chi-Square test. This showed r = *0.08, N = 879, p = 0.185 (p > 0.05)*. The analysis showed no significant relationship, as 389 respondents (Christian: 72.2% and Muslim: 27.8%) claimed that they would declare their HIV status if they were confirmed to be positive, compared to 287 respondents (Christian: 67.9% and 32.1%) who said they would not reveal their HIV status. The concern is that a significant number of respondents (203 of whom Christians formed 75.4% and with Muslims forming 24.6%) claimed that they did not know and this could show the efficiency of Faith Based Organisations (FBOs) and Community Based Organisations (CBOs).

Respondents' religion and HIV-test awareness

The research investigates the relationship between respondents' religion and HIV-test awareness using a Chi-Square test. The analysis revealed a significant relationship: *r = 0.09, N = 926, p = 0.007 (p<0.05)*. The concern is that, significant numbers of respondents (639, Christian: 69.5%; Muslim: 30.5%) do not want to be HIV-tested compared to 287 respondents who were tested (Christian: 78% and Muslim: 22%). This result showed a low awareness of HIV-testing.

5.6.5 Respondents' educational class and chi-square test

Respondents' educational class and HIV transmission understanding

The relationship between respondents' educational class and HIV transmission understanding was tested using Chi-Square test. The analysis showed a level of significance: *r = 0.2, N = 938, p = 0.001 (p < 0.05)*. Significant respondents 525 (SSS1 – 19%, SSS2 – 21.9%, SSS3 – 26.9% and tertiary institutions – 32.2%) show a lack of HIV transmission understanding compared to 399 respondents (SSS1 – 12%, SSS2 – 17.3%, SSS3 – 19.3% and tertiary institution – 51.4%). Statistically, a considerable number of tertiary institution students show lower levels of HIV transmission understanding than secondary school students. School-based HIV/AIDS organisations (SBOs) might not be effective with regard to HIV transmission understanding.

Respondents' educational class and STIs clinical remedy understanding

The study evaluates the relationship between respondents' educational class and knowledge of STIs clinical remedies. A Chi-Square test was used and the analysis showed a level of significance as follows: *r = 0.32, N = 910, p = 0.001 (p < 0.05)*. A Significant number of respondents 560 (SSS1 – 12.5%, SSS2 - 14.6%, SSS3 – 20.9% and tertiary institutions 52%) confirmed that they have knowledge of STIs treatments compared to 251 respondents (SSS1 – 17.9%, SSS2 – 27.9%, SSS3 – 30.7% and tertiary institutions 23.5%) that do not. Statistically, tertiary institution students appear to have more knowledge of STI treatment than the SSS1-3 students.

Respondents' educational class and use of condoms

The relationship between respondents' educational class and use of condoms was examined using a Chi-Square test. The analysis showed a level of significance: $r = 0.17, N = 956, p = 0.001 (p < 0.05)$. The study showed the extent of condom use as 456 respondents (SSS1 – 18.9%, SSS2 – 16%, SSS3 – 20.6% and tertiary students – 44.5%) confirmed that they used condoms during casual sex compared to 239 respondents (SSS1 – 14.6%, SSS2 – 23.8%, SSS3 – 20.1% and tertiary students – 41.4%) that did not. The tertiary institution students appear to be more protective during casual sex than SSS1-3 students but statistically their use of condoms is low. The concern is that, 261 respondents (7.3%) did not answer the question. This might be due to a reluctance to reveal these facts.

Respondents' educational class and fear of stigmatisation

The study considered the relationship between respondents' educational class and fear of stigmatisation through the use of a Chi-Square test. The analysis revealed a level of significance as follows: $r = 0.13, N = 887, p = 0.02 (p < 0.05)$. Statistically, fears of stigmatisation appear pronounced in all the educational classes and the analysis did not show a disparity among the respondents. The tertiary institutions' 161 respondents displayed a level of maturity (to declare their HIV status if positive compared to other educational classes SSS1-3). A significant number of 289 respondents in all the educational classes claimed that they would not declare their HIV status if it was positive. Lack of confidence in the Lagos State AIDS Control Agency (LSACA) networks could be the militating factor.

Respondents' educational class and HIV-test awareness

The study considered respondents' educational class and HIV-test awareness using a Chi-Square test as shown in $r = 0.44, N = 934, p = 0.001$. The analysis revealed a level of significance; 287 respondents (SSS1 – 6.3%, SSS2 – 10.1%, SSS3 – 11.8% and tertiary students – 71.8%) had been for HIV-testing in the previous two years while 647 respondents (SSS1 – 20.7%, SSS2 – 24.4%, SSS3 – 28.6%) did not want a HIV test. Statistically, tertiary institution students show a level of awareness regarding HIV-testing relative to SSS1-3 students. Educational level and exposures could raise HCT awareness at Lagos University.

5.7 Summary

The chapter present respondents' knowledge on HIV/AIDS transmission and prevention through the collected empirical data. This has revealed knowledge gaps responsible for the current HIV/AIDS prevalence in Lagos State and includes the ineffectiveness of HCT centres activities (stated in Section 5.4.0) and behavioural issues of risk groups. The chapter has established the possibility of introducing telecommunication (GSM) into HIV/AIDS activities in order to enhance awareness on prevention strategies and behavioural change communication.

6 Validation

This chapter validates the empirical responses (see Figure 3.3), via triangulation techniques, in order to identify gaps that contribute to the current HIV prevalence in Lagos State (Section 6.1). Section 6.2 presents the knowledge gaps in the research area. Section 6.3 offers the use of Knowledge Management (KM) to address the empirical issues (Appendix IV) and presents a validated framework (VII) to enhance HIV/AIDS activities. The chapter concludes with a summary of the chapter.

6.1 Triangulation

The strength of study relies on the chosen research methodology (Saunders *et al*. 2003). The research uses a *multi-method* triangulation technique (using quantitative and qualitative methods). Chapter Five addressed the quantitative aspects through descriptive statistical analysis complemented by inferential statistics to reveal the strength of the variables. The qualitative aspect relied on semi-structured interviews with Lagos State AIDS Control Agency (LSACA) decision makers. The chapter has reveals and compares knowledge gaps through selected indicators, as illustrated in Figure 6.1.

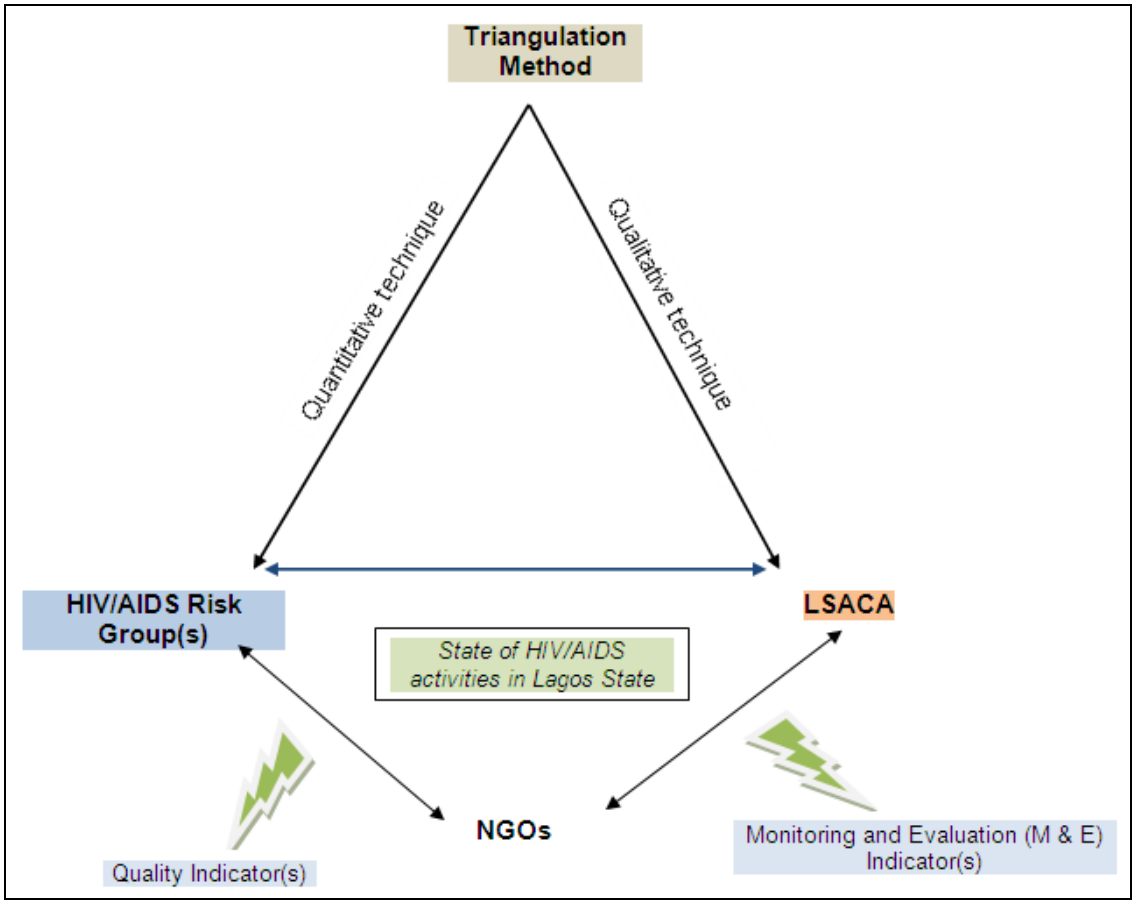


Figure 6.1 Research analysis

6.2 Knowledge gaps

Knowledge transformation and sharing appears to be the main challenges behind HIV/AIDS activities in Nigeria as revealed by the empirical study. The study has established gaps through the statistical analysis (descriptive and inferential), which has further revealed that Lagos State students have an insufficient understanding of HIV/AIDS risk factors and knowledge. Such gaps are one factor contributing to the current state of HIV/AIDS prevalence as shown in the discussion about the Lagos State AIDS Control Agency (LSACA) organisational issues. The gaps are revealed as shown in the empirical research (Appendix IV).

6.2.1 State of HIV transmission awareness

The level of HIV transmission awareness is verified using indices of HIV-transmission knowledge (definition, virus and transmission) – one gap revealed by the empirical study was the respondents' lack of HIV-transmission. LSACA (2010) claimed that concerted efforts were made to strengthened HIV/AIDS prevention activities before the end of 2010 through mass communication, peer and one-to-one education across the Lagos State metropolis. The problem of HIV in Lagos State could be tackled by raising awareness about how to reduce HIV-transmission (including practising sexual abstinence, safe sex, blood screening and preventing syringe sharing) as confirmed by this research.

6.2.2 Sexual transmitted infection (STIs) clinical remedy

The empirical study revealed less awareness about treatments for STIs. The literatures reaffirmed that sexual activities account for over 80 per cent of HIV cases in Nigeria. In this study, Lagos State students (respondents) presents of lack awareness and knowledge of STIs clinical remedy. Youthful sexual activities in Lagos State schools and the surrounding areas contribute to the HIV incidence rate and should be addressed. LSACA (2010) claimed their stakeholders (ie. the NGOs) address STIs awareness via social concerts and organised seminars but these measures do not appears to be fully meeting the expectations and challenges. Furthermore, it is not clear how many people these initiatives are targeting. A technological approach could increase STIs awareness of both preventive behaviour and treatments.

6.2.3 Use of condoms

The use of condoms has been adopted as a way of preventing STIs and a method of contraception. Not all respondents reported that they used condoms during penetrative and oral sex. This could increase the vulnerability to STIs and HIV infection among the sexually active groups. Use of condoms during sex is regarded as a youthful behavioural issue among the risk groups but is less applicable to married couples, which makes the result inconclusive. The state of awareness about female condoms increases the vulnerability of women in casual sex networks although LSACA (2010) reaffirmed that the use of condoms among the risk groups is a matter of personal choice. Implementation of the healthcare information management technique towards HIV/AIDS behavioural change communication (BCC) and information, education communication (IEC) could have a positive impact and addresses the challenges.

6.2.4 Fears of HIV/AIDS stigmatisation

The HIV/AIDS stakeholders and counselling centres have lost their integrity and confidence with regard to the cultural and religious challenges that indirectly promote fears of HIV stigmatisation in Nigerian society (Smith, 2004). The respondents are prone to fears of stigmatisation due to their age and education level. Fears of HIV/AIDS stigmatisation is pronounced in Lagos State Schools due to the fact that young teenagers cannot openly discuss sex education. Fears of stigmatisation could be addressed through the implementation of technology to HIV activities in Nigeria.

6.2.5 Efficiency of HIV counselling and testing centres

The empirical study showed the state of efficacy of Lagos State HIV counselling and testing (HCT) centres through respondents' awareness about the HIV test and facilities centre. LSACA (2010) claimed that the HCT centres are available for HIV counselling and testing for the people of Lagos State. The study revealed low level of awareness for all the respondents' demographic categories. A lack of trust and confidence in the HCT centres by the people of the Lagos metropolis could be the militating factors, and the availability of knowledge transfer technologies to address awareness could help tackle this.

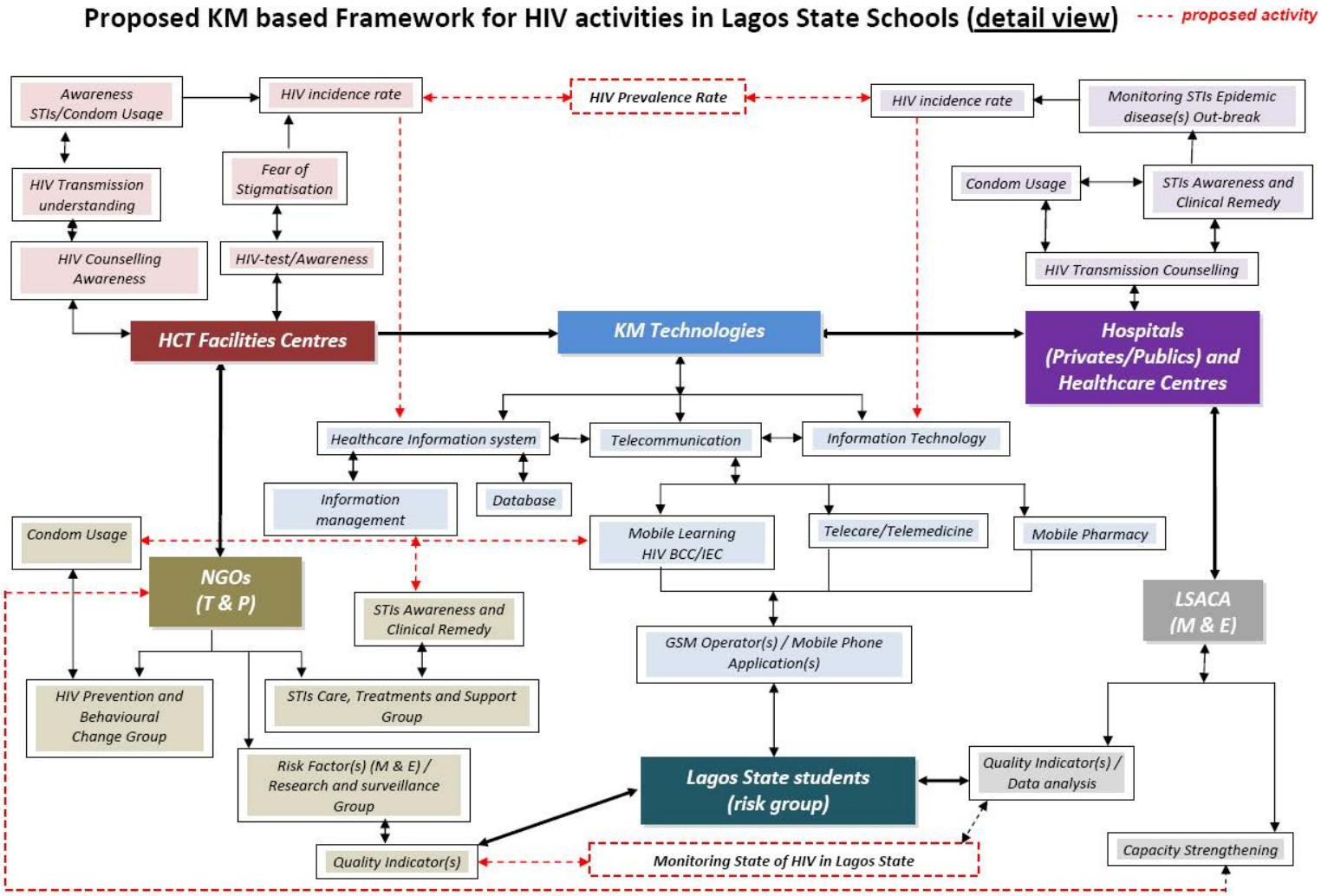
Respondents' Demography		HIV Transmission Understanding	STIs Clinical Remedy Awareness	Use of Condom	Awareness on Stigmatisation	HIV-test Awareness	HCT centres Awareness (in their areas)
GENDER	*Male*	Low	Medium	Medium	Medium	Low	Low
	Female	Medium	Medium	Low*	Medium	Low	Low
AGE GROUP	*15-16*	Low	Medium	Low	Medium	Low	Low
	17-18	Low	Medium	Medium	Medium	Low	Low
	19-20	Low	Medium	Medium	Medium	Low	Low
	21-22	Medium	Medium	Medium	Medium	Medium	Medium
	23-24	Medium	High	Medium	Medium	Medium	Medium
	25 and above	Medium	High	Medium	Medium	Medium	Medium
MARITAL STATUS	*Single*	Medium	Medium	Medium	Medium	Low	Low
	Married	Medium	High	I / U	Medium	Medium	Medium
RELIGION	*Christian*	Medium	Medium	Medium	Medium	Low	Medium
	Muslim	Low	Medium	Medium	Medium	Low	Low
EDUCATION LEVEL	*SSSI*	Low	Medium	Medium	Medium	Low	Low
	SSSII	Low	Medium	Low	Medium	Low	Low
	SSSIII	Low	Medium	Medium	Medium	Low	Low
	Tertiary Inst.	Medium	High	Medium	Medium	Medium	Medium
RESPONDENTS' DIVISION	*Badagry*	Low	Medium	Low	Medium	Low	Low
	Epe	Low	Low	Medium	Medium	Low	Low
	Ikeja	Medium	Medium	Medium	Medium	Medium	Medium
	Ikorodu	Medium	Medium	Low	Medium	Low	Low
	Lagos Island	Medium	Medium	Medium	Medium	Low	Medium

Note: < or equal 40% = Low, 41-74% = Medium, > or equal 75% = High;
* Lack of female condom awareness; I / U: Inconclusive/Unknown

6.3 Conceptual framework validation: KM-centric

Lindland *et al*. (1994) define a framework as a conceptual model and set of statements in a language-based activity. The framework for this research (Appendix V) expresses a new mode of knowledge transfer to enhance HIV/AIDS activities. It was developed to address the empirical study challenges and applicable to other risk factors awareness activities that affect HIV/AIDS prevalence and mortality (using Figure 2.15 concept). The framework considered important factors that could affect implementation such as cost, flexibility, integration and users' requirements as described by Moody and Shanks (2003). However, the framework considered the current LSACA organisational knowledge isolation and division and proposed a way that the organisation would be able to efficiently deliver quality technological based HIV activities in Lagos State.

Moody and Shanks (2003) suggested that for effective system implementation, the stakeholders should be engaged in the validation process and critical discussion of it. The framework has included the perspective of the LSACA and HIV non-governmental organisation (NGOs) at the validation stage. Involvement of the Lagos State HIV/AIDS stakeholder in the framework validation improves its availability and sustainability, if implemented. The validation routine has established the frameworks' ability to be Implemented, its reliability and availability for NGOs to address the current state of HIV/AIDS activities (Apena *et al*. 2010-11).


Proposed KM based Framework for HIV activities in Lagos State Schools (detail view)
proposed activity
Awareness STIs/Condom Usage
HIV incidence rate
HIV Prevalence Rate
HIV incidence rate
Monitoring STIs Epidemic disease(s) Out-break
HIV Transmission understanding
Fear of Stigmatisation
Condom Usage
STIs Awareness and Clinical Remedy
HIV Counselling Awareness
HIV-test/Awareness
HIV Transmission Counselling
HCT Facilities Centres
KM Technologies
Hospitals (Privates/Publics) and Healthcare Centres
Healthcare Information system
Telecommunication
Information Technology
Information management
Database
Condom Usage
Mobile Learning HIV BCC/IEC
Telecare/Telemedicine
Mobile Pharmacy
NGOs (T & P)
STIs Awareness and Clinical Remedy
LSACA (M & E)
GSM Operator(s) / Mobile Phone Application(s)
HIV Prevention and Behavioural Change Group
STIs Care, Treatments and Support Group
Risk Factor(s) (M & E) / Research and surveillance Group
Lagos State students (risk group)
Quality Indicator(s) / Data analysis
Quality Indicator(s)
Monitoring State of HIV in Lagos State
Capacity Strengthening

6.3.1 Stakeholders' selection: rational and justification

The Lagos State AIDS Control Agency (LSACA) is the main organisation involved in the HIV/AIDS operation, with over four hundreds NGOs and HIV facilities centres (stakeholders) working in eight thematic groups (Figure 4.1). The selection factors of the NGOs for the proposed framework validation are based on their HIV activities (prevention and transmission) and their location, which includes the following non-clinical areas:

(i) Information, Education and Communication (IEC) activities,

(ii) Care and Support of PLWHA (fear stigmatisation),

(iii) HIV counselling and testing (HCT) and

(iv) Monitoring and Evaluation activities.

The justification behind the selection of stakeholders is their strength and the challenges of their areas such as the geographical setting in order to consider factors that could pose as odd against implementation of a new approach, as described by Bali *et al.* (1999). The proposed framework could shrink staff capacity and affect organisational culture as the activities would primarily be electronic (information management).

6.3.2 The stakeholders' profile

The validation participants are eight stakeholders that were individually consulted to comment on and evaluate the possibility of KM introduction to the HIV/AIDS activities in Lagos State. The profile of the stakeholders is briefly described in Table 6.1-8:

Stakeholder 'A'

Types of organisation	NGO
Strength of staff	10, Full time staff: 7, Volunteers: 3
Area of focus	HIV/AIDS prevention, HCT, Treatment, Care and Support, OVC, Economic empowerment
Target group of interest	Youths, Children, Men, Women and Adult

Table 6.1 Stakeholders' A profile

Stakeholder 'B'

Types of organisation	NGO
Strength of staff	15, Full time staff: 4, Volunteers: 11
Area of focus	Care, support and Drama (Awareness activities)
Target group of interest	Youths, Men, Women and Adult

Table 6.2 Stakeholders' B profile

Stakeholder 'C'

Types of organisation	State Government Health Facility
Strength of staff	26, Full time staff: 26, Volunteers: 0
Area of focus	HCT, STIs and TB Treatment
Target group of interest	Youths and Adult

Table 6.3 Stakeholders' C profile

Stakeholder 'D'

Types of organisation	NGO
Strength of staff	18, Full time staff: 8, Volunteers: 10
Area of focus	HIV/AIDS prevention and Economic empowerment
Target group of interest	Youths and Adult

Table 6.4 Stakeholders' D profile

Stakeholder 'E'

Types of organisation	State Government Health Facility
Strength of staff	15, Full time staff: 15, Volunteers: 0
Area of focus	HIV/AIDS counselling on Transmission and prevention
Target group of interest	Youths and Adult

Table 6.5 Stakeholders' E profile

Stakeholder "F"

Types of organisation	NGO
Strength of staff	20, Full time staff: 5, Volunteers: 15
Area of focus	HIV/AIDS prevention, Economic Empowerment
Target group of interest	Youths and Women

Table 6.6 Stakeholders' F profile

Stakeholder "G"

Types of organisation	NGO
Strength of staff	22, Full time staff: 10, Volunteers: 12
Area of focus	HIV/AIDS prevention, HCT, Care and Support
Target group of interest	Youths, Children, Men, Women, Adult, Sex workers and forces

Table 6.7 Stakeholders' G profile

Stakeholder "H"

Types of organisation	Local Government Department of Health
Strength of staff	40, Full time staff: 10, Volunteers: 30
Area of focus	HIV/AIDS prevention, HCT, Care, Support and PMTCT
Target group of interest	Youths, Children, Men, Women, Adult, Sex workers and PLWHA

Table 6.8 Stakeholders' H profile

6.3.3 Summary of stakeholder comments and discussion

The stakeholders commented on the introduction of KM concepts through the technological-based framework presentation to enhance Lagos State HIV/AIDS activities. The stakeholders responses on the framework are summarised below in numerical order the questions asked (the detailed responses can be found in Appendix VI – Framework Validation responses).

1. **What is your view regarding the application of Knowledge Management (KM) (healthcare information system, telecommunication and information technology) to synchronize HIV/AIDS activities (non-clinical) in Lagos State as shown on the proposed framework?**

Stakeholders	Responses
A	The stakeholder described the use of electronic information as a modern age means to enhance activities and it could help the current situation.
B	The NGO stated that, "it is a fantastic idea, if properly managed"
C	The Healthcare facility centre said, it appear to be a helpful idea and could strengthen HIV/AIDS activities.
D	The stakeholder claimed, the framework appears to be a good means of information dissemination and sharing.
E	The NGO claimed it to be a good idea.
F	Claimed that this is a good model that encompasses the important stakeholders.
G	The NGO described telecommunication as the most effective medium of communication to cover the most students.
H	The framework is described as "a sound model which captures the target audience irrespective of location"

Discussion: All the participants collectively embrace the KM model as an initiative that could promote HIV/AIDS activities in Lagos State. Stakeholders' main concern is whether the implementation will be properly managed.

2. **What is your view regarding the adoption of information-based techniques (mobile learning techniques, telecare/telemedicine and mobile pharmacy) and Mobile Phone applications (SMS text and call) to address HIV/AIDS behavioural issues and overall awareness as shown on the proposed framework?**

Stakeholders	Responses
A	The information-based technique is described as a helpful approach which could be very effective.
B	The NGO raise concern about application of mobile pharmacies as less people use text messaging.
C	Claimed it will be helpful, as information-based techniques are widely used in the modern world.
D	Stated that, " it is good and applicable"
E	Adoption of information-based techniques is good but people may not understand them.
F	The framework is described as a "novel idea" for information management.
G	The framework may limit door-to-door activities and enhance information management
H	The value of mobile telecommunication is recognised as a way to promote information management.

Discussion: Stakeholder B raised concerns about the efficiency of mobile pharmacies due to the level of education in Nigerian society. The framework is designed for the risk group (students) - nevertheless both applications (SMS and call) are expected to be adopted for the follow-up and monitoring the initiative efficacy.

3. **Do you think the proposed KM based framework shown will be accessible, reliable and sustainable for HIV activities in Lagos State? If not, please comment (feel free to indicate on the detailed framework diagram).**

Stakeholders	Responses
A	Claimed that, the framework is "achievable" and appears to be reliable and sustainable; provided that there is alternative to power supply to service the initiative.
B	Stated that, the framework could be accessible, reliable and sustainable if the stakeholders are committed to the activities.
C	Claimed that the apex bodies and the government should put in effort and make the framework achievable, then it will be more reliable.
D	The stakeholder stated that the targeted age group could affect the reliability and availability of the model.
E	Claimed that, it could be reliable and available.
F	Claimed the model appears to be a reliable initiative but modification should be expected as part of the implementation
G	The response is not related.
H	Stated the framework could solve HIV issues but more emphasis should be on awareness and monitoring.

Discussion: The stakeholders generally accept the framework to be a good initiative that could be reliable and accessible. They claimed it is too early to discuss sustainability but it is a vital factor to be considered during engineering modelling against mean time before failure (MTBF) factor and system availability.

4. **Please provide your views on addressing HIV transmission awareness/understanding via Lagos State students (risk group) GSM-Mobile phone applications (SMS text and calls) through electronic mobile learning technique.**

Stakeholders	Responses
A	The stakeholder reaffirmed that all students use mobile phones for social activities and the framework could use this opportunity to actualize the model
B	The stakeholder laid emphasis on one-to-one and the framework should be a supportive initiative.
C	The stakeholders confirmed the use of mobile phones among students and thought this could be a medium of communication for HIV/AIDS information, education and communication (IEC).
D	The stakeholder advises that, the implementation of the framework should be used for concise and important HIV information to the risk groups.
E	Claimed that the introduction of the KM initiative could elevate the state of HIV awareness and advised that it should be made users friendly.
F	The stakeholder stated that, KM appears to be a great initiative and should be implemented.
G	The stakeholder commented that the concept is fine, could overcome fears of discussing HIV and increases HIV IEC programmes' effectiveness through mobile learning techniques.
H	The stakeholder felt that, the model appears to be a good solution but was concerned about its cost as many students do not have access to mobile phone (GSM).

Discussion: The stakeholders generally commented that the introduction of the KM initiative (aided by electronic learning techniques) into HIV/AIDS activities in Lagos State appears to be a good solution. The survey has revealed that 86.5% of 958 respondents use mobile phones and shows that they are widely used among Lagos State students (reference to stakeholder H fears).

5. **Do you think STIs clinical remedy awareness can be strengthened through mobile phones, using telecare/telemedicine and mobile pharmacy initiatives in Lagos State Schools (as shown on the proposed framework)?**

Stakeholders	Responses
A	The stakeholder claimed that the introduction of mobile phones and other electronic healthcare information could strengthen the STIs awareness programmes.
B	The stakeholder stated that it could strengthen the STIs awareness with the consideration of language barriers.
C	The stakeholder claimed that the framework could enhance HIV behavioural change communication and IEC on STIs clinical remedy and treatments.
D	The stakeholder confirmed that the framework could strengthen STIs treatments awareness in Lagos State.
E	The stakeholder stated that the framework will be helpful as part of STIs awareness activities, if language issues are considered.
F	The stakeholder stated that the introduction of the KM concept will promote personal integrity and confidentiality in the STIs awareness programme.
G	The stakeholder claimed that the concept could be helpful to STIs awareness, but one-to-one programmes shouldn't be ruled out of the activities.
H	The stakeholder claimed yes that the framework could strengthen STIs awareness programmes.

Discussion: The stakeholders gave a general view that the framework will strengthen STIs awareness programmes. The stakeholder F claimed it could indirectly promote discussion about sex issues as the Nigerian culture forbids such public discussion.

6. **Please provide your views on whether the proposed framework could be used to address HIV behavioural change communication (BCC) and information, education and communication (IEC) on use of Condom and fear of stigmatisation among Lagos State students.**

Stakeholders	Responses
A	The stakeholder confirmed that the framework could be used to address HIV BCC and IEC without incurring costs.
B	The response did not correlate
C	The stakeholder stated that the framework is a good concept and could be adopted into HIV behavioural issues.
D	The stakeholder claimed that the implementation of the framework will determine its success.
E	The stakeholder mentioned that the risk groups' religion and tribe could be factors of framework efficacy on HIV behavioural issues if implemented.
F	The stakeholder claimed that the framework will be helpful as a way of increasing HIV BCC and IEC activities regarding the use of condoms and stigmatisation.
G	The stakeholder stated that the framework appears to be a good initiative on HIV BCC and IEC, but it could pose a disturbance to mobile subscribers.
H	The stakeholder claimed that the framework will assist to intensify and improve HIV BCC regarding the use of condoms and stigmatisation.

Discussion: The stakeholders accepted the framework for HIV BCC and IEC regarding the use of condoms and fears of stigmatisation. Stakeholder B provided an uncorrelated response. Stakeholder G mentioned that it could disturb other GSM subscribers.

7. **Do you think the proposed framework will enhance HIV-test and HIV counselling awareness to a greater level via Lagos State students' mobile phone technologies?**

Stakeholders	Responses
A	The stakeholder claimed that the framework will support HIV-test and counselling awareness if implemented as shown.
B	The stakeholder mentioned that the framework should be implemented first and then comments can be made about its efficiency.
C	The stakeholder stated it will support HIV-test and counselling awareness activities.
D	The stakeholders claimed that the framework may support HIV-test and counselling if the healthcare information system on the model is properly managed.
E	The stakeholder claimed that the use of mobile phones may not be realistic for HIV-testing and counselling awareness.
F	The stakeholder stated that the framework appears to increase the awareness of HIV-testing and counselling
G	The stakeholder stated that the proposed framework appears realistic and achievable for HIV-test and counselling programmes if properly implemented.
H	The stakeholder commented that the proposed framework will support awareness activities of HIV-testing and counselling, but other mediums of communication should be annexed into the model in the future.

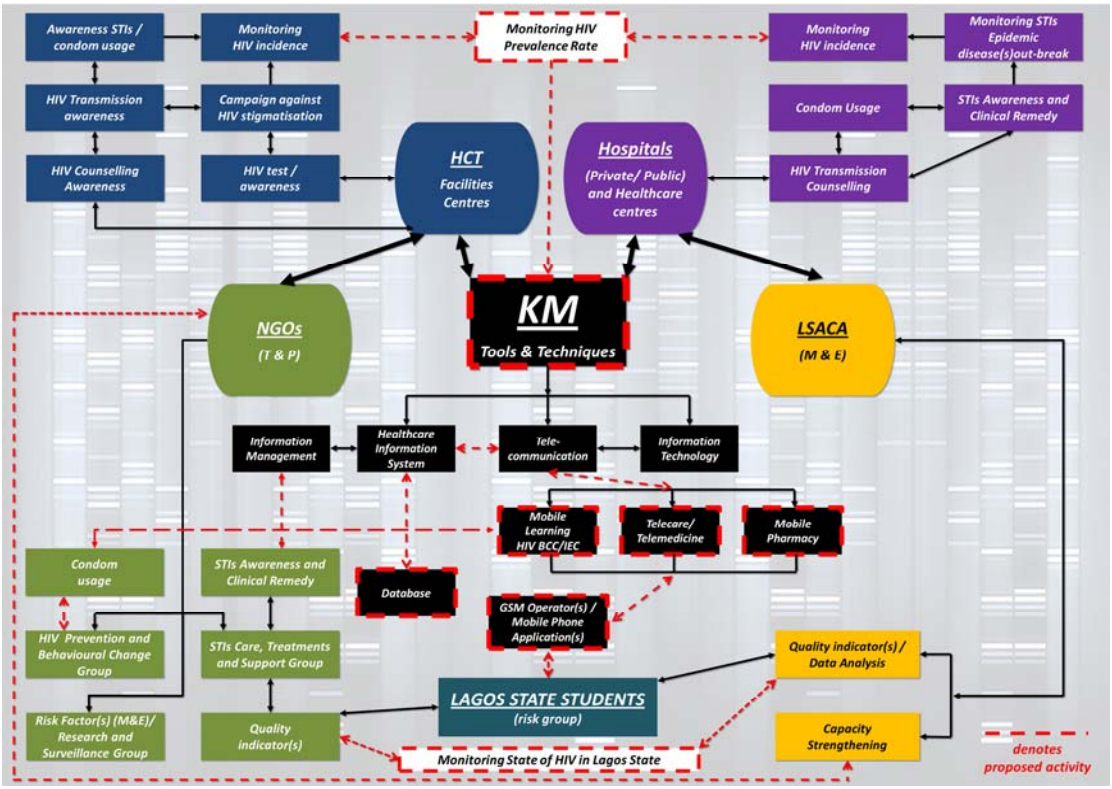
Discussion: The majority of the stakeholders commented that the framework will enhance HIV-testing and counselling awareness in Lagos State, but E claimed that mobile phones cannot be used for the awareness activities.

8. Do you have any further comments on the proposed framework?

Stakeholders	Responses
A	Advised that social languages should be used in acceptable hours of operation.
B	Suggested that dramatic ways of communicating will enhance HIV awareness rather than anonymous operations.
C	Said that the implementation of the framework will bring positive changes to HIV/AIDS activities in Lagos State.
D	Mentioned that the framework appears to be a solution to the HIV/AIDS awareness issues in Lagos State.
E	Advised that certain factors such as people, religion and culture should be taken into consideration during the implementation.
F	Said that the model appears complex but supported the introduction of the database initiative.
G	Advised that the framework needs to be monitored at all stages of implementation, in order to achieve its efficiency and desired aim.
H	Suggested that the model should be tested or prototype form to ascertain its reliability and possible modification.

6.4 Summary

After thorough validation (via triangulation techniques) and detailed analysis (see chapter 5), various knowledge gaps were identified. Based on these gape, a new, validated, framework was developed (see Appendix VII). The framework (shown below, a larger version is available in the appendices) will also be available for faith-based organisations (FBOs) and traditional organisations to promote HIV/AIDS awareness.



Proposed framework for HIV activities in Lagos (Appendix VII)

Furthermore, the framework considers other risk factors that militate against HIV/AIDS in Nigeria and the cost of implementation. It aims to unify HIV/AIDS capacity leaders, biomedical professionals and other stakeholders to reduce the effect "lost knowledge". The implementation of the framework will enhance HIV/AIDS transmission, prevention and fear of stigmatisation awareness in the Lagos State of Nigeria.

7 Conclusion

This chapter concludes the thesis and presents a detailed summary of its major findings and implications (Section 7.1). Section 7.2 presents research milestones as evidence of originality; Section 7.3 show that the objectives of this research were met as outlined in Chapter 1. Section 7.4 discusses contributions of the research to knowledge. The limitations and challenges facing healthcare in Nigeria including HIV/AIDS are discussed in Sections 7.5. Recommended future work is suggested in Section 7.6. Section 7.7 celebrates research achievement and concluding observations.

7.1 Research summary

This Chapter summarizes the contribution of this research project. The study set out to answer the research question and deliver the objectives mentioned in chapter 1. The method synchronised qualitative and quantitative research methodologies to address knowledge gaps and produce empirical research (Appendix IV). The qualitative research clarified the research direction and provided a comparison to the quantitative research, the analysis of which is described in Chapter 5. This study not only identifies current HIV/AIDS risk factors among Lagos State students, but introduced an e-health knowledge transfer initiative using KM tools (as detailed in Chapter 6). This work (Final framework) has shown that this initiative is likely to be successful if it is implemented to support activities of the HIV/AIDS stakeholders in Lagos State.

In addition, the validated knowledge transfer initiative will enhance HIV/AIDS awareness activities and address behavioural issues in the Lagos State administrative divisions. The concept of knowledge management (KM) is identified as a way of improving organisational issues and tackling the challenges faced by people affected by HIV/AIDS. In this project, the KM was applied to activities concerned with information, communication and technology (ICT) and Healthcare information management related to HIV/AIDS activities.

7.2 Originality of the research

Baskaran (2008) and Dwivedi (2003) stated that PhD research should show originality and make a contribution in the research domain. Cryer (2000) confirmed that PhD research originality varies, from creating or inventing new knowledge or providing a novel twist to existing knowledge. However, they all noted that academic research required originality and a contribution to knowledge. This study met the criteria of research originality, competency and knowledge contribution as summarized in Table 7.1.

Criteria for Research Originality	*Evidence in thesis*
Evidence of major investigation	Evaluation of HIV/AIDS risk factors among Lagos State Students.
Source for quality data	• Questionnaire-based survey in all Lagos State Local Governments divisions. • Interview of HIV/AIDS stakeholders (LSACA). • KM in healthcare.
Use of data	Triangulation methodology was adopted in the study, as aggregates of qualitative and quantitative research techniques to strengthen the direction of study.
Carrying out empirical work that hasn't been done before (Originality in outcomes)	• Empirical study on Lagos State students as a potential risk group for HIV/AIDS transmission. • Core concept of knowledge transformation. • KM framework to disjointed HIV/AIDS knowledge.
Ability to make critical use of published work and source material	References on HIV/AIDS perspectives and KM initiatives such as global demographic review on transmission and Bali *et al.* KM initiatives.
Setting down a major piece of new information.	• Revealed HIV/AIDS knowledge gaps among the Lagos State students that is responsible for the current prevalence. • Prediction of HIV/AIDS risk factors through inferential statistic (Chi-Square test).
Potentially publishable	A conference proceeding and three journal papers work are in progress.
Being cross-disciplinary (Engineering concept and healthcare)	This thesis work is true of cross-disciplinary work of engineering concept of e-Health care delivery and information management system.
Making a synthesis that hasn't been made before (Originality in by-product).	• This thesis introduces e-Health to HIV/AIDS activities to enhance awareness using available technologies. • Produce an empirical KM framework.

Table 7.1 Summary of research originality

7.3 Objectives accomplished

The study makes a contribution to applied research through the use of ICT to design a framework to enhance HIV/AIDS activities in Lagos State. This is the first study to apply KM to (non-clinical) HIV/AIDS activities. The research presented in the thesis contains a comprehensive evaluation of HIV/AIDS risk factors in related to awareness and education in all the Lagos State administrative divisions. The research successfully proposes a validated KM-based framework to address the research question and vital issues of HIV/AIDS transmission and prevention awareness in Lagos State. The study completed the objectives proposed in Chapter 1 as follows:

- reviewed holistic global initiatives on HIV/AIDS transmission and prevention
- reviewed HIV/AIDS initiatives in Nigeria and Lagos State (via the Lagos State AIDS Control Agency (LSACA))
- reviewed e-Health (database, telecare, healthcare information management, mobile pharmacy, and e-portals)
- evaluated student HIV/AIDS awareness and education in Lagos State (non-clinical)
- identified knowledge gaps related to HIV/AIDS in Lagos State
- Produced a validated framework on e-Health applications for HIV/AIDS activities in Lagos State Schools (Appendix V).

7.4 Contributions to knowledge and HIV/AIDS activities in Lagos State

The study produced a detailed analysis of the current state of HIV/AIDS through the highlighted indicators in Chapter 3 (Table 3.1). The findings (Appendix IV) identified the challenges for HIV/AIDS stakeholders in Lagos State and showed the strength of the LSACA network. The study used quality HIV indicators to establish the knowledge gaps between the stakeholders and Lagos State students (risk group). The qualitative data from semi-structured interview provided information about the capacity leaders and awareness of HIV counselling and testing (HCT) activities in the Lagos State administrative divisions. The validated framework provided a way of addressing HIV stigmatisation and discrimination. Method of implementation using mobile learning, telecare and mobile pharmacies were described.

Knowledge transformation and synchronisation were put forward as initiatives that could eradicate the current biomedical knowledge divisions. The proposed centralised database aimed to establish a link between the Lagos State private hospitals and biomedical professionals to assist with knowledge and information sharing and provide a means of evaluating the quality of their activities. The proposed information management system is intended to unify non-government organisations (NGOs) through telecommunication (mobile phones) and information technology to enhance HIV activities and knowledge sharing. These activities aim to control the incidence of HIV rate through the use of a knowledge-based initiative (frame work).

7.5 HIV/AIDS organisational issues (Challenges)

The Federal Government of Nigeria - FGN approach (Figure 1.3) to HIV/AIDS activities from the Federal level to Local Authorities seems complex and tends to make it difficult to share knowledge and to consider others factors. There are too many HIV/AIDS organisations tackling awareness issues. This appears complex and there are problems with monitoring, evaluation and cost.

7.5.1 Information and knowledge sharing

Information and knowledge sharing among the Lagos State HIV/AIDS stakeholders is limited by a number of key debilitating factors (Apena *et al.*, 2010). Private and public hospitals are currently working in isolation and there are over 400 NGOs working on HIV/AIDS initiatives under LSACA (Chapter 4) network. The operations of the stakeholders appear questionable as there are limitations in their continuity. The NGOs are working unilaterally without fieldwork updates from others. The risk groups are left in ignorance due to lack of information and contact points. HIV/AIDS capacity leaders do not have access to the current incidence rates as well as those of and STIs transmission in the rural areas. HIV/AIDS information, education and communication on cultural practices such as the use of sharps instruments to make tribal marks, head shaving, circumcision, traditional birth attendants and occult activities are yet to be addressed in Nigerian rural communities.

7.5.2 Government policy and bureaucracy

The activities of the line Ministries are limited due to the executive governments' interest and civil service bureaucracy. Nigerian civil service rules do not empower

civil servants to apply initiatives without the executive government's approval. It is important to consider the Nigerian government's response since the first incidence of HIV/AIDS in Lagos State (1986) until the time when it was declared as an epidemic in 2000 (Chapter 2). Ineffective government policy on public healthcare and HIV/AIDS has contributed to an increase in illness and mortality rates.

Ministries and concerned stakeholders are not empowered to use their initiatives to address HIV/AIDS challenges in their respective communities due to politics and bureaucracy. The NGOs commented on the governments' policies on HIV/AIDS outlining that it promotes discrimination and segregation, as many active stakeholders are neglected. Equity and transparency from government officials to stakeholders appears to be an issue affecting promotion of HIV/AIDS awareness at community level. Governments' policies should empower HIV/AIDS capacity leaders to adopt modern (information age) techniques to promote HIV/AIDS awareness.

7.5.3 HIV/AIDS capacity leaders and NGOs challenges

The mutual relationship between the capacity leaders and the NGOs determines the success and rate of development. This study takes into account that capacity leaders' interest in NGOs varies and this has undermined their performance. The level of corruption and mismanagement of healthcare resources is pronounced in the Sub-Saharan region of Africa. Resources are not deployed to NGOs based on mitigating factors but based on sentiments. Furthermore, the study noted that there are no indices of measurements of NGOs' activities in relation to HIV/AIDS. There

are no means of evaluation and monitoring to determine the performance of the stakeholders while the HIV/AIDS incidence rate increases every year.

7.5.4 Transportation and communication

The study confirmed that transportation has always posed a challenge to Lagos State public healthcare due to population issues and the nature of the topography (Chapter 1). Thirty percent of Lagos State is covered with creeks, rivers and lagoons. This reduces access to quality healthcare and social welfare facilities such as HIV/AIDS information, education and communication (IEC) and behavioural information and communication. The topographic features cut off rural areas from the urban metropolis and undermine their HIV information and awareness activities. This makes it difficult to tackle the activities of traditional birth attendants and occult activities in the rural areas of Lagos State.

Communications coverage is limited and poses a disadvantage to HIV/AIDS behavioural information and communication media. Transportation and communications militate against education and other public awareness. The NGOs and LACA activities in relation to HIV/AIDS awareness are incapacitated in the Lagos State islands due to the inaccessibility and communication coverage. Cost, monitoring and evaluation of the HIV/AIDS stakeholders appear to be an on-going problem.

7.5.5 Lack of funds

Funds and trust are behavioural factors of humanity. Funding is a major factor facing public healthcare and pose a challenge to HIV/AIDS activities in African nations. In the mid-1980s, less attention was paid to research due to the lack of funds. Political and economic influences affect the level of international interest to African nation's public healthcare issues and mortality.

This study confirmed that the HIV/AIDS funds are not channelled towards appropriate measures and the actions of some NGOs are questionable. The mismanagement and corruption have generally reduced the level of support and international interest regarding HIV/AIDS awareness in Nigeria. Lagos State enjoys support from international and United Nations organisations due to its economic and demographic implications on West African trade (Apena *et al*, 2010). The influx of migrants from other states that have less funding to address HIV/AIDS influences the Lagos State incidence rate and prevalence.

7.6 Future work

The work described in this thesis has discussed the HIV/AIDS risk factors among students in all the Lagos State administrative divisions. The framework is based on the knowledge gaps and takes other risk groups are into consideration. There are still further opportunities to evaluate other risk groups and modify the framework if this is found to be necessary. Some suggestions of areas for further consideration are:

- A study of young people who not attend school, to establish possible risk factors such as awareness about the use of sharps, intravenous (IV) drugs and the effect of the environment on their activities.

- The contribution of cultural and religious factors on HIV/AIDS transmission and prevalence in Lagos State rural areas. The investigation could establish the language barriers that affect HIV/AIDS organisations. Also, the impact of traditional birth attendance, mother-to-child transmission (MTCT), violence against women and child labour.

- The behaviour of sex workers, including the use of IV drugs, condom use and STIs awareness.

- The impact of child trafficking and abuse awareness on HIV/AIDS prevalence.

- The impact of people commuting from rural to urban areas on HIV/AIDS awareness. The impact of extra-marital affairs and rape between transport workers and overnight traders on HIV/AIDS transmission. This is essential to identify the challenges facing HIV/AIDS NGOs and capacity leaders.

- The level of awareness about HIV/AIDS transmission among military peace keepers.

7.7 Achievements and concluding observation

The future of healthcare in Lagos State lies with Government officials and their policy and decision making processes. The Lagos State healthcare system lacks Knowledge Management (KM) initiatives and the attitudes of biomedical professionals to patients (the people and process aspects in KM) contribute to the high mortality rate in the state. The thesis makes several contributions to knowledge (as highlighted in section 7.4) and introduces a novel approach (a validated framework) to achieve positive healthcare outcomes by improving the current situation of HIV/AIDS in Lagos State. These celebrate a great achievement in the research domain.

The efficiency of the proposed framework lies on government parastatal entities (such as LSACA and the Lagos State Hospital Management Board) and the chosen telecommunication firm. The efficiency of the framework will positively reduce the impact of NGOs (helping to cut down on unnecessary bureaucracy) and enhance easy monitoring and evaluation of activities from risk groups' responses. Awareness activities, especially those pertaining to HIV/AIDS risk factors, will be more pronounced at both the rural and urban community level as transportation and communication issues will be minimal.

Fear of HIV/AIDS stigmatisation and discrimination (HASD) to people living with HIV/AIDS (PLWHA) and other risk groups is also addressed via the introduction of mobile pharmacies to reduce rate of spread of sexually transmitted infections (STIs). The framework supports anonymous interactions between biomedical professionals and risk groups through mobile telecommunication means which would help allay

concerns about stigmatisation and discrimination as well as address the cultural and religious impact that has given rise to the present prevalence rate in Lagos State.

The proposed framework advocates the efficacy of HIV counselling and testing (HCT) centres. These will help address behavioural communication change (BCC) issues and increase awareness on condom usage, campaign against stigmatisation and HIV test and counselling for PLWHA on transmission (risk factors). Lack of awareness of HCT centres has increased vulnerabilities of the people of Lagos State and risk groups (Section 2.1.2) to HIV transmission (Section 2.1.3) due to lack of knowledge.

Longer term, the study will successfully help introduce Knowledge Management (KM) precepts to synchronise and unify healthcare initiatives in Lagos State. The proposed framework will enhance existing information management systems among biomedical professionals to influence positive healthcare outcomes, clinical decisions and epidemiological monitoring and evaluation. An effective database system will strengthen the proposed efficacy of E-Health and offer solutions for hospitals' knowledge isolation, both in public and private spheres.

Organisational challenges (such as bureaucracy and behavioural issues) are addressed by the framework. Policy makers, NGOs and risk groups are to be checked and monitored in order to address prevailing issues using quality indicators. The framework could also be tailored to address awareness issues concerning other challenging diseases such as cardiovascular diseases (CVDs) and diabetes.

Having discussed the immense contributions of this research, it is recommended that the Lagos State Government and its AIDS Control Agency (LSACA) explore the implementation of this framework (Appendix VII) in order to address the HIV/AIDS epidemic in the state.

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List of Appendices

Appendix I

Published Papers

1. Sassman R, Apena W, Bali RK, Naguib RNG, Marshall IM and Odetayo M (2011) "Issues in Evaluating Knowledge-Based HIV/AIDS Programmes: Perspectives From Nigeria", *Proc of the Developments in e-Systems Engineering conference*, December 2011, Dubai, UAE [CD-ROM]

2. Apena W, Bali RK, Binnersley J, Naguib RNG, Odetayo MO and Wickramasinghe N, The challenge of HIV/AIDS organisations in Nigeria: making sense through Knowledge Management, *International Journal of Healthcare Delivery Reform Initiatives*, submitted September 2012

3. Apena W, Bali RK, Binnersley J, Naguib RNG, Odetayo MO and Baskaran V, Evaluation of HIV health services in Lagos State: an empirical study, *International Journal of Services, Economics and Management*, submitted November 2012

4. Apena W, Bali RK, Binnersley J, Naguib RNG, Odetayo MO and Baskaran V, HIV/AIDS Behavioural Challenges in Lagos State Schools: An Empirical Study, *International Journal of Technology, Policy and Management,* submitted November 2012

Appendix II

(a) Questionnaire for Lagos State students

(b) Semi structure interview

QUESTIONNAIRE

"Evaluating Knowledge-Based HIV/AIDS Education Initiatives in Lagos"

I am a PhD research student with the *Biomedical Computing and Engineering Technologies (BIOCORE) Applied Research Group* at Coventry University (UK). This work is in fulfillment of the requirements for the award of Doctor of Philosophy (PhD) in Engineering and Knowledge Management.

Any information provided will be treated confidentially and used for research purposes only.

Thank you in advance for your assistance.

Waliu Olalekan Apena

SECTION A

Instructions: please tick the applicable box

1 *Gender*

Male		Female	

2 *Age (years)*

15-16		17-18		19-20	
21-22		23-24		25+	

3 *Marital Status*

Single		Married		Separated	
Divorced		Widowed			

4 *Religion*

Christianity		Islam		Traditionalist	
Atheist		Other (specify)			

5 (i) *Local Govt. Area* .....

(ii) *Special Locality* .....

6 *How long have you lived in this area?*

Less than a year		1 – 5	
6 – 10		11 – 15	

7 What School/Class/Level/ Year are you?

(i) Senior sec. school:

SSS I	
SSS II	
SSS III	

Tertiary Institution:

University	
Polytechnic	
College of Educ.	

(ii) Faculty/School/ College: ……

(iii)Year/ Level: ……..

SECTION B

Instruction: Please you may mark more than one answer.

1 ***What is HIV?***

Homosexual Immunodeficiency Virus		Homosexual Infection Virus	
Human Immunodeficiency Virus		Human Infection Virus	

2 ***Where is HIV found in a person?***

Nail		Hair		Blood	

3 ***How is HIV/AIDS transmitted through?***

Mosquito Bites		Blood & Blood Products		Trans Placenta	
Homosexual intercourse		Touching		Breast milk	
Heterosexual intercourse		Kissing		Hand shake	
Drug abuse/Sharing syringes		Others (specify)……..			

4 ***What are the signs & symptoms of HIV/AIDS?***

Persistent diarrhoea		Weight loss		Skin rashes	
Persistent fever		Persistent cough			

5 ***What age range is more commonly affected by HIV/AIDS?***

0 – 5years		6 – 10years		21 – 25years	
11 – 15years		16 – 20years		26years >	

6 ***Which is high-risk group for HIV/AIDS?***

Biomedical staff		Overnight		

		Marketers		Civil servants	
Business executives		Homosexuals		Students	

Others (Specify) ……

7 *What are STIs?*

Signal Transmission and Interference(s)		Students and Teachers Initiatives	
Sexually Transmitted Infection(s)		Not sure	

8 *Is there any Clinical remedy for STIs?*

Yes		Not Sure		No	

9 *Are you aware of any cure for HIV/AIDS?*

Yes		Not Sure		No	

10 *How can HIV/AIDS Transmission be avoided?*

Faithfulness to partners		Single use of disposable syringes	
Use of Condoms for casual sex		Screening all blood and blood products for HIV	
Behavioural change		Vaccination	

Others (Specify) ……

SECTION C

1 *Do you have more than one sexual partner?*

Yes		No	

If your answer to question 1 above is yes, continue, if no skip question 2

2 *How many sexual partners have you had in the last 5 years?*

2 – 5		6 – 10		11 – 15	
16 – 20		More than 20		None	

3 *Do you use condom when you have sex?*

Yes		No	

4 *What precaution do you take in your private life against HIV infection?*

Avoidance of casual sex		Use of Condom		None	
Total abstinence from sex					

Other (Specify) ……..

5 ***Do you use medicine regularly via the parenteral route e.g. intravenous (using needle and syringe)?***

Yes ☐ No ☐

6 ***Have you ever seen an HIV/AIDS patient?***

Yes ☐ No ☐ Don't know ☐

7 ***Would you care and give help to an HIV/AIDS patient?***

Yes ☐ No ☐ Don't know ☐

8 ***Do you feel for People Living with HIV/AIDS (PLWHA)?***

Yes ☐ No ☐ Don't know ☐

9 ***What should be done to HIV/AIDS patients?***

Have nothing to do with them ☐ Don't associate with them at all ☐

Send them to hospital for treatment ☐ Others (Specify) ……

10 ***If you have HIV/AIDS will you tell others you have the disease?***

Yes ☐ No ☐ Don't know ☐

SECTION D

1 ***Have you ever been tested for HIV?***

Yes ☐ No ☐

If yes, when?

2 – 5 ☐ 6 – 10 ☐ 11 – 15 ☐

2 ***Did you know any HIV Counseling and Testing (HCT) Centre in your area?***

Yes ☐ No ☐

3 ***Would you submit yourself for HIV screening, so as to know your status?***

Yes ☐ No ☐

4 ***Have you ever been given Lecture or Lesson on HIV/AIDS?***

Yes ☐ No ☐

5 ***Who would you inform if you are HIV positive?***

Spouse		Lover(s)		Parent	
Hospital staff		Sibling		Friends	
Teachers or Lecturer					

6 ***How often do you observe HIV/AIDS advert in the media (TV, Radio and Bill Board)?***

Very common		Average		Not common	

SECTION E

1 ***What type of Phone are you using?***

Land Line		Mobile	

2 ***Do you send and receive text on your Phone?***

Yes		No	

3 ***Which Network do you subscribed to e.g. MTN, Glo etc?***

Please specify……..

4 ***Have you ever received text(s) on your phone regarding HIV/AIDS from any organization or establishment?***

Yes		No	

5 ***Have you received text(s) on your phone regarding other diseases from any organization or establishment?***

Yes		No	

If yes, which disease?

Please specify……..

6 ***What type of information was given about the disease? (Awareness, testing, or any other information etc.)***

Please specify……..

Thank you.

Coventry University
Faculty of Engineering and Computing
Coventry, United Kingdom.

Data Collection Consent Form

Research Topic: "Evaluating Knowledge-based HIV/AIDS Education Initiatives in Lagos".

Research Team: Dr. Rajeev K. Bali (Director of Studies)
Prof. Raouf N G. Naguib
Dr. Michael O. Odetayo
Mr. Waliu O. Apena (Student)

Please initial box

I confirm that I understand the information for this data collection task:

1. I have had the opportunity to consider the information, ask questions and have had these answered satisfactorily.
[ ]

2. I understand that my participation is in the capacity of Lagos State AIDS Control Agency (LSACA) as a member staff (Project Unit).
[ ]

3. I understand that the interview transcripts and tape may be shared with other members of the research team, and that quotations (identifiable only by "Respondent X") may be included in the final thesis of this current research.
[ ]

4. I agree to take part in this research
[ ]

……	……	……...
Name of participant	Signature	Date

……	……	……...
Name of Student	Signature	Date

Interview Start

Topic: Evaluating Knowledge-Based HIV/AIDS Education Initiatives in Lagos.

INTRODUCTION

I am a PhD research student with the Biomedical Computing and Engineering Technologies (BIOCORE) Applied Research Group, Coventry University, Coventry, United Kingdom.

This work is in fulfillment of the requirement for the award of Doctor of Philosophy (PhD) in Engineering and Knowledge Management.

Any information provided will be treated confidentially and used for research purposes only.

Thank you in advance for your assistance.

Waliu Olalekan, APENA

Part 1

1. What is the strength of LSACA network in the rural areas of Lagos State including urban communities?

2. What are the current activities of LSACA on Overnight marketers as a risk group?

   - HIV/AIDS awareness

3. How is LSACA addressing HIV/AIDS awareness and education among young students in Lagos State?

Part 2

1. How are LSACA caring for People Living with HIV/AIDS (PLWHA)?
   - Treatment and Support

2. How is PLWHA given education on prevention and further spread?

Part 3

1. How active and efficient is HIV counselling and testing (HCT) centres in Lagos State?
   - All the Local Government Areas (LGAs)
   - Community-base

2. How are these centres (HCT) effective to risk groups?
   - Young students
   - Overnight marketers
   - PLWHA

3. What are the modes of preventing re-test of HIV/AIDS positive?
   - Biometric coding/ ID number
   - DNA database

4. Discuss application of effective Knowledge transfer on capacity builders, such application of telecommunications to address HIV/AIDS prevention and transmission.
   - Radio
   - Teletext (Television)
   - One-to-one communication
   - Mobile phone

5. What attention does LSACA gives to Sexually Transmitted Infections (STIs)?

   - Awareness during out-break in the communities
   - Monitoring in schools

***Thank you*.**

Appendix III

Chapter 5 - Analysis Tables

5.1 Respondents Demographic Profile

Gender		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	421	43.9	44.0	44.0
	FEMALE	535	55.8	56.0	100.0
	Total	956	99.8	100.0	
Missing	System	2	0.2		
Total		**958**	**100.0**		

Table 5.2: Respondents Gender

Marital Status		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SINGLE	822	85.8	88.6	88.6
	MARRIED	95	9.9	10.2	98.8
	DIVORCED	5	0.5	0.5	99.4
	WIDOW	2	0.2	0.2	99.6
	SEPARATED	4	0.4	0.4	100.0
	Total	928	96.9	100.0	
Missing	System	30	3.1		
Total		**958**	**100.0**		

Table 5.3: Respondents Marital Status

Religion		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Christianity	681	71.1	71.8	71.8
	Islam	265	27.7	28.0	99.8
	Trad.	1	0.1	0.1	99.9
	Others	1	0.1	0.1	100.0
	Total	948	99.0	100.0	
Missing	System	10	1.0		
Total		**958**	**100.0**		

Table 5.4 Respondents Religion

Classes		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	SSS1	156	16.3	16.3	16.3
	SSS2	189	19.7	19.8	36.1
	SSS3	226	23.6	23.6	59.7
	UNIVERSITY	378	39.5	39.5	99.3
	POLYTECHNIC	1	0.1	0.1	99.4
	COLLEGE OF EDU.	6	0.6	0.6	100.0
	Total	956	99.8	100.0	
Missing	System	2	0.2		
Total		958	100.0		

Table 5.5: Respondents Educational Class

5.2. Respondents Knowledge on HIV Transmission

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Correct	776	81.0	82.6	82.6
	Not Correct	136	14.2	14.5	97.1
	No Idea	27	2.8	2.9	100.0
	Total	939	98.0	100.0	
Missing	System	19	2.0		
Total		**958**	**100.0**		

Table 5.6 Response to "What is HIV?"

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	NAIL	50	5.2	5.2	5.2
	HAIR	30	3.1	3.1	8.4
	BLOOD	869	90.7	91.1	99.5
	NO IDEA	5	0.5	0.5	100.0
	Total	954	99.6	100.0	
Missing	System	4	0.4		
Total		**958**	**100.0**		

Table 5.7 Response to "Where is HIV virus found?"

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Correct	399	41.6	42.5	42.5
	Not Correct	526	54.9	56.0	98.5
	No Idea	14	1.5	1.5	100.0
	Total	939	98.0	100.0	
Missing	System	19	2.0		
Total		**958**	**100.0**		

Table 5.8 Students Response on HIV/AIDS Transmission

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Correct	437	45.6	47.4	47.4
	Not Correct	471	49.2	51.1	98.6
	No Idea	13	1.4	1.4	100.0
	Total	921	96.1	100.0	
Missing	System	37	3.9		
Total		**958**	**100.0**		

Table 5.9 Respondents Knowledge on HIV/AIDS Symptoms

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	BIOMEDICAL STAFF	54	5.6	6.1	6.1
	BUSINESS EXECUTIVES	14	1.5	1.6	7.6
	OVERNIGHT MARKETERS	332	34.7	37.3	44.9
	HOMOSEXUALS	226	23.6	25.4	70.3
	CIVIL SERVANT	12	1.3	1.3	71.7
	STUDENTS	234	24.4	26.3	98.0
	No Idea	9	0.9	1.0	99.0
	All	9	0.9	1.0	100.0
	Total	890	92.9	100.0	
Missing	System	68	7.1		
	Total	**958**	**100.0**		

Table 5.10 Respondents View on Risk Groups

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Correct	839	87.6	90.4	90.4
	Not Correct	64	6.7	6.9	97.3
	No Idea	25	2.6	2.7	100.0
	Total	928	96.9	100.0	
Missing	System	30	3.1		
Total		**958**	**100.0**		

Table 5.11 Understanding on Risk Factors

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	560	58.5	61.5	61.5
	No	100	10.4	11.0	72.4
	Not Sure	251	26.2	27.6	100.0
	Total	911	95.1	100.0	
Missing	System	47	4.9		
Total		**958**	**100.0**		

Table 5.12 Respondents Understanding on STIs Clinical Remedy

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	161	16.8	17.2	17.2
	No	584	61.0	62.5	79.8
	Not Sure	189	19.7	20.2	100.0
	Total	934	97.5	100.0	
Missing	System	24	2.5		
Total		**958**	**100.0**		

Table 5.13 Respondents View on HIV/AIDS Cure

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Correct	826	86.2	89.3	89.3
	Not Correct	91	9.5	9.8	99.1
	No Idea	8	0.8	0.9	100.0
	Total	925	96.6	100.0	
Missing	System	33	3.4		
Total		**958**	**100.0**		

Table 5.14 Respondents View on HIV infection Avoidance

5.3.0 HIV Transmission and Stigmatisation in Lagos State Schools

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	138	14.4	15.8	15.8
	No	735	76.7	84.1	99.9
	No response	1	0.1	0.1	100.0
	Total	874	91.2	100.0	
Missing	System	84	8.8		
Total		**958**	**100.0**		

Table 5.15 Response on Casual Sex

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	None	331	34.6	60.5	60.5
	2-5	158	16.5	28.9	89.4
	6-10	22	2.3	4.0	93.4
	11-15	4	0.4	0.7	94.1
	16-20	17	1.8	3.1	97.3
	>20	15	1.6	2.7	100.0
	Total	547	57.1	100.0	
Missing	System	411	42.9		
Total		**958**	**100.0**		

Table 5.16 Respondent Casual Sex in the Last 5 years

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	457	47.7	47.7	47.7
	No	239	24.9	24.9	72.7
	No response	262	27.3	27.3	100.0
	Total	958	100.0	100.0	

Table 5.17 Respondents view on Use of Condom

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	767	80.1	88.1	88.1
	None	104	10.9	11.9	100.0
	Total	871	90.9	100.0	
Missing	System	87	9.1		
Total		**958**	**100.0**		

Table 5.18 Respondents View on HIV Transmission Precautions

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	240	25.1	29.0	29.0
	No	589	61.5	71.0	100.0
	Total	829	86.5	100.0	
Missing	System	129	13.5		
Total		**958**	**100.0**		

Table 5.19 Evaluating Intravenous Drug Users (IDUs)

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	366	38.2	39.4	39.4
	No	433	45.2	46.6	86.0
	Don't Know	130	13.6	14.0	100.0
	Total	929	97.0	100.0	
Missing	System	29	3.0		
Total		**958**	**100.0**		

Table 5.20 Respondents and HIV/AIDS Patients

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	706	73.7	73.7	73.7
	No	105	11.0	11.0	84.7
	No response	147	15.3	15.3	100.0
	Total	958	100.0	100.0	

Table 5.21 Respondents Opinion on HIV Stigmatisation

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	727	75.9	75.9	75.9
	No	139	14.5	14.5	90.4
	No response	92	9.6	9.6	100.0
	Total	958	100.0	100.0	

Table 5.22 Respondents Feeling to PLWHA

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	ASSOCIATE	862	90.0	90.0	90.0
	DON'T ASSOCIATE	46	4.8	4.8	94.8
	NO RESPONSE	50	5.2	5.2	100.0
	Total	958	100.0	100.0	

Table 5.23 Presumed Respondents Association with PLWHA

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	395	41.2	44.5	44.5
	No	290	30.3	32.7	77.1
	Dont know	203	21.2	22.9	100.0
	Total	888	92.7	100.0	
Missing	System	70	7.3		
Total		**958**	**100.0**		

Table 5.24 Fear of Stigmatisation Height in Lagos State

5.4.0 Evaluation of HIV Counselling and Test (HCT) Centres in Lagos State

Description of Respondents in Lagos State Administrative Divisions: Gender

Sex		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	57	34.8	35.0	35.0
	FEMALE	106	64.6	65.0	100.0
	Total	163	99.4	100.0	
Missing	System	1	0.6		
Total		**164**	**100.0**		

Table 5.25 (a) Respondents Captured from Badagry Division

Sex		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	85	54.1	54.5	54.5
	FEMALE	71	45.2	45.5	100.0
	Total	156	99.4	100.0	
Missing	System	1	0.6		
Total		**157**	**100.0**		

Table 5.25 (b) Respondents Captured from Epe Division

Sex		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	177	47.3	47.3	47.3
	FEMALE	197	52.7	52.7	100.0
	Total	**374**	**100.0**	100.0	

Table 5.25 (c) Respondents Captured from Ikeja Division

Sex		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	35	32.7	32.7	32.7
	FEMALE	72	67.3	67.3	100.0
	Total	**107**	**100.0**	100.0	

Table 5.25 (d) Respondents Captured from Ikorodu Division

Sex		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	62	45.6	45.6	45.6
	FEMALE	74	54.4	54.4	100.0
	Total	**136**	**100.0**	100.0	

Table 5.25 (e) Respondents Captured from Lagos Island Division

Sex		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MALE	5	25.0	25.0	25.0
	FEMALE	15	75.0	75.0	100.0
	Total	**20**	**100.0**	100.0	

Table 5.25 (f) Non-Lagos State Respondents Captured

5.4.1 Awareness for HIV Test in Lagos State Divisions

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Tested	43	26.2	27.0	27.0
	Not tested	116	70.7	73.0	100.0
	Total	159	97.0	100.0	
Missing	System	5	3.0		
Total		**164**	**100.0**		

Table 5.26(a) Respondents Awareness to HIV Test in Badagry Division

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Tested	17	10.8	11.0	11.0
	Not tested	138	87.9	89.0	100.0
	Total	155	98.7	100.0	
Missing	System	2	1.3		
Total		**157**	**100.0**		

Table 5.26(b) Respondents Awareness to HIV Test in Epe Division

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Tested	159	42.5	43.3	43.3
	Not tested	208	55.6	56.7	100.0
	Total	367	98.1	100.0	
Missing	System	7	1.9		
Total		**374**	**100.0**		

Table 5.26(c) Respondents Awareness to HIV Test in Ikeja Division

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Tested	16	15.0	15.1	15.1
	Not tested	90	84.1	84.9	100.0
	Total	106	99.1	100.0	
Missing	System	1	0.9		
Total		**107**	**100.0**		

Table 5.26(d) Respondents Awareness to HIV Test in Ikorodu Division

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Tested	44	32.4	34.4	34.4
	Not tested	84	61.8	65.6	100.0
	Total	128	94.1	100.0	
Missing	System	8	5.9		
Total		**136**	**100.0**		

Table 5.26(e) Respondents Awareness to HIV Test in Lagos Island Division

5.4.2 HIV Counselling and Testing Centres in Lagos State Metropolis

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Aware	57	34.8	37.0	37.0
	Not Aware	97	59.1	63.0	100.0
	Total	154	93.9	100.0	
Missing	System	10	6.1		
Total		**164**	**100.0**		

Table 5.27(a) Height of HCT Awareness in Badagry Division

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Aware	43	27.4	27.6	27.6
	Not Aware	113	72.0	72.4	100.0
	Total	156	99.4	100.0	
Missing	System	1	0.6		
Total		**157**	**100.0**		

Table 5.27(b) Height of HCT Centres Awareness in Epe Division

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Aware	164	43.9	45.3	45.3
	Not Aware	198	52.9	54.7	100.0
	Total	362	96.8	100.0	
Missing	System	12	3.2		
Total		**374**	**100.0**		

Table 5.27(c) Height of HCT Centres Awareness in Ikeja Division

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Aware	33	30.8	32.0	32.0
	Not Aware	70	65.4	68.0	100.0
	Total	103	96.3	100.0	
Missing	System	4	3.7		
Total		**107**	**100.0**		

Table 5.27(d) Height of HCT Centres Awareness in Ikorodu Division

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Aware	57	41.9	44.9	44.9
	Not Aware	70	51.5	55.1	100.0
	Total	127	93.4	100.0	
Missing	System	9	6.6		
Total		**136**	**100.0**		

Table 5.27(e) Height of HCT Centres Awareness in Lagos Island Division

5.4.3 Respondents Behaviour towards HCT Centres in Lagos State

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	127	77.4	82.5	82.5
	No	27	16.5	17.5	100.0
	Total	154	93.9	100.0	
Missing	System	10	6.1		
Total		**164**	**100.0**		

Table 5.28(a) Behavioural Change towards HCT Centres in Badagry Division

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	74	47.1	47.7	47.7
	No	81	51.6	52.3	100.0
	Total	155	98.7	100.0	
Missing	System	2	1.3		
Total		**157**	**100.0**		

Table 5.28(b) Behavioural Change towards HCT Centres in Epe Division

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	317	84.8	87.6	87.6
	No	45	12.0	12.4	100.0
	Total	362	96.8	100.0	
Missing	System	12	3.2		
Total		**374**	**100.0**		

Table 5.28(c) Behavioural Change towards HCT Centres in Ikeja Division

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	89	83.2	85.6	85.6
	No	15	14.0	14.4	100.0
	Total	104	97.2	100.0	
Missing	System	3	2.8		
Total		**107**	**100.0**		

Table 5.28(d) Behavioural Change towards HCT Centres in Ikorodu Division

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	112	82.4	88.2	88.2
	No	15	11.0	11.8	100.0
	Total	127	93.4	100.0	
Missing	System	9	6.6		
Total		**136**	**100.0**		

Table 5.28(e) Behavioural Change towards HCT Centres in L/Island Division

5.4.4 HIV/AIDS Behavioural Lectures/Lessons in Lagos State

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	126	76.8	80.8	80.8
	No	30	18.3	19.2	100.0
	Total	156	95.1	100.0	
Missing	System	8	4.9		
Total		**164**	**100.0**		

Table 5.29(a) Evaluation of HCT Centres on BCC/BCI in Badagry Division

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	100	63.7	65.8	65.8
	No	52	33.1	34.2	100.0
	Total	152	96.8	100.0	
Missing	System	5	3.2		
Total		**157**	**100.0**		

Table 5.29(b) Evaluation of HCT Centres on BCC/BCI in Epe Division

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	331	88.5	90.2	90.2
	No	36	9.6	9.8	100.0
	Total	367	98.1	100.0	
Missing	System	7	1.9		
Total		**374**	**100.0**		

Table 5.29(c) Evaluation of HCT Centres on BCC/BCI in Ikeja Division

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	88	82.2	85.4	85.4
	No	15	14.0	14.6	100.0
	Total	103	96.3	100.0	
Missing	System	4	3.7		
Total		107	100.0		

Table 5.29(d) Evaluation of HCT Centres on BCC/BCI in Ikorodu Division

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	104	76.5	80.6	80.6
	No	25	18.4	19.4	100.0
	Total	129	94.9	100.0	
Missing	System	7	5.1		
Total		**136**	**100.0**		

Table 5.29(e) Evaluation of HCT Centres on BCC/BCI in Lagos Island Division

5.4.5 Respondents Evaluation on HIV/AIDS BCC/BCI

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	spouse	142	14.8	15.8	15.8
	Hospital staff	193	20.1	21.4	37.2
	teacher/lecturer	8	0.8	0.9	38.1
	Lover	57	5.9	6.3	44.4
	sibling	24	2.5	2.7	47.1
	parent	467	48.7	51.8	98.9
	friends	10	1.0	1.1	100.0
	Total	901	94.1	100.0	
Missing	System	57	5.9		
Total		**958**	**100.0**		

Table 5.30 Respondent Population on HIV BCC/BCI Communication Channel

5.4.6 HIV/AIDS Information, Education and Communication in Lagos State

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Common	659	68.8	71.9	71.9
	Average	172	18.0	18.8	90.6
	Not Common	86	9.0	9.4	100.0
	Total	917	95.7	100.0	
Missing	System	41	4.3		
Total		**958**	**100.0**		

Table 5.31 Evaluation of IEC in Lagos State

5.1.1 Global System For Mobile (GSM) Communication

5.5.1 Types of Phone Used Among Lagos State Students

Phones		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Landline	80	8.4	8.8	8.8
	Mobile	829	86.5	91.2	100.0
	Total	909	94.9	100.0	
Missing	System	49	5.1		
Total		**958**	**100.0**		

Table 5.32 Evaluating Use of Phone in Lagos State

5.5.2 Evaluating Use of Short Messaging Services (SMS)

SMS		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	831	86.7	91.1	91.1
	No	81	8.5	8.9	100.0
	Total	912	95.2	100.0	
Missing	System	46	4.8		
Total		**958**	**100.0**		

Table 5.33 Respondents Use of SMS

5.5.3 Mobile Phone Networks Coverage and Efficiency in Lagos State

Networks		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MTN	374	39.0	39.9	39.9
	ZAIN	234	24.4	25.0	64.9
	GLO	147	15.3	15.7	80.6
	ETISALAT	36	3.8	3.8	84.4
	MULTILINK	22	2.3	2.3	86.8
	VISAPHONE	37	3.9	3.9	90.7
	STARCOMMS	15	1.6	1.6	92.3
	NO NETWORK	72	7.5	7.7	100.0
	Total	937	97.8	100.0	
Missing	System	21	2.2		
Total		**958**	**100.0**		

Table 5.34 GSM Network Subscribers Respondents Population

5.5.4 Evaluating Use of Mobile Phone for HIV/AIDS Activities

Options		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	237	24.7	26.2	26.2
	No	667	69.6	73.8	100.0
	Total	904	94.4	100.0	
Missing	System	54	5.6		
Total		**958**	**100.0**		

Table 5.35 Use of Mobile Phone for HIV/AIDS Activities

5.6 Correlation

5.6.1 Gender and Chi-Square Test

Variables	Male	Female	p-value
Understanding on HIV Transmission			
Correct	149	250	0.001
Not correct	253	271	
No idea	10	4	
STIs Clinical Remedy Knowledge			
Correct	238	322	0.236
Not Correct	50	49	
Not Sure	117	133	
Use of Condom			
Yes	256	200	0.001
No	90	149	
No Response	75	186	
Fear of Stigmatisation			
Yes	170	224	0.215
No	142	148	
Don't Know	85	117	
Awareness for HIV-test			
Tested	115	172	0.102
Not Tested	296	350	

Table 5.37 Gender and Chi-Square Test

5.6.2 Respondents Age Groups and Chi-Square Test

Variables	15-16	17-18	19-20	21-22	23-24	25 and above	p-Value
Understanding HIV Transmission							
Correct	121	64	5	13	54	139	0.001
Not correct	200	127	16	12	53	109	
No idea	5	1	0	4	3	1	
STIs Clinical Remedy							
Correct	148	95	10	20	88	194	0.001
Not Correct	46	23	4	2	6	15	
Not Sure	117	65	8	7	13	37	
Use of Condom							
Yes	131	99	13	21	61	126	0.001
No	84	40	5	4	26	76	
Not Response	118	56	4	5	25	51	
Fear of Stigmatisation							
Yes	137	81	12	13	42	107	0.507
No	107	61	5	13	29	68	
Don't Know	68	39	4	3	30	57	
Awareness for HIV-test							
Tested	48	25	4	13	56	139	0.001
Not tested	278	165	18	17	50	109	

Table 5.38 Respondents Age Groups and Chi-Square Test

5.6.3 Respondents Marital Status and Chi-Square Test

Variables	Singles	Married	P-Value
Understanding on HIV Transmission			
Correct	347	46	0.829
Not correct	449	55	
No idea	13	1	
STIs Clinical Knowledge			
Correct	468	81	0.001
Not Correct	85	9	
Not Sure	229	12	
Use of Condom			
Yes	401	43	0.001
No	182	48	
Not Response	239	15	
Fear of Stigmatisation			
Yes	338	44	0.894
No	251	29	
Don't Know	175	19	
Awareness for HIV-test			
Tested	211	68	0.001
Not tested	592	34	

Table 5.39 Respondents Marital Status and Chi-Square Test

5.6.4 Respondents Religion and Chi-Square Test

Variables	Christianity	Islam	P-Value
Understanding on HIV Transmission			
Correct	309	89	0.002
Not correct	353	166	
No idea	7	6	
STIs Clinical Knowledge			
Correct	425	129	0.001
Not Correct	58	41	
Not Sure	165	83	
Use of Condom			
Yes	292	159	0.001
No	170	66	
Not Response	219	42	
Fear of Stigmatisation			
Yes	281	108	0.185
No	195	92	
Don't Know	153	50	
Awareness for HIV-test			
Tested	224	63	0.007
Not tested	444	195	

Table 5.40 Respondents Religion and Chi-Square Test

5.6.5 Respondents Educational Class and Chi-Square Test

Variables	SSS1	SSS2	SSS3	Tertiary Institutions	P-Value
Understanding on HIV Transmission					
Correct	48	69	77	205	0.001
Not correct	100	115	141	169	
No idea	2	2	5	5	
STIs Clinical Knowledge					
Correct	70	82	117	291	0.001
Not Correct	28	22	25	24	
Not Sure	45	70	77	59	
Use of Condom					
Yes	86	73	94	203	0.001
No	35	57	48	99	
Not Response	35	59	84	83	
Fear of Stigmatisation					
Yes	61	83	90	161	0.015
No	62	61	57	109	
Don't Know	20	38	59	86	
Awareness for HIV-test					
Tested	18	29	34	206	0.001
Not tested	134	158	185	170	

Table 5.41 Respondents Educational Class and Chi-Square Test

Appendix IV

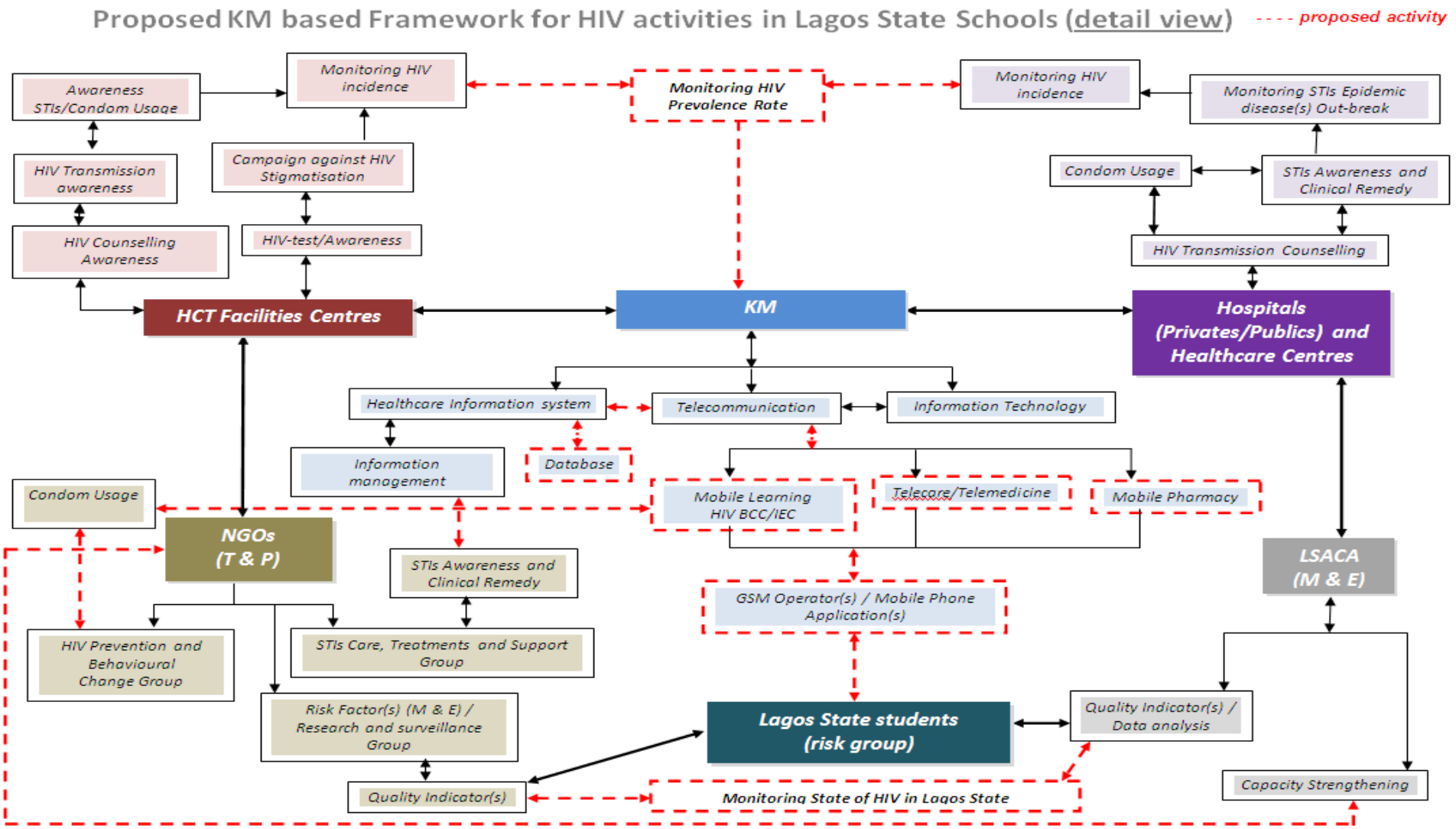
Empirical Research Table

Note: < or equal 40% = Low, 41-74% = Medium, > or equal 75% = High; * Lack of female condom awareness; I / U Inconclusive/Unknown

Respondents' Demography		*HIV Transmission Understanding*	*STIs Clinical Remedy Awareness*	*Use of Condom*	*Awareness on Stigmatisation*	*HIV-test Awareness*	*HCT centres Awareness (in their areas)*
GENDER	*Male*	Low	Medium	Medium	Medium	Low	Low
	Female	Medium	Medium	Low*	Medium	Low	Low
AGE GROUP	*15-16*	Low	Medium	Low	Medium	Low	Low
	17-18	Low	Medium	Medium	Medium	Low	Low
	19-20	Low	Medium	Medium	Medium	Low	Low
	21-22	Medium	Medium	Medium	Medium	Medium	Medium
	23-24	Medium	High	Medium	Medium	Medium	Medium
	25 and above	Medium	High	Medium	Medium	Medium	Medium
MARITAL STATUS	*Single*	Medium	Medium	Medium	Medium	Low	Low
	Married	Medium	High	I / U	Medium	Medium	Medium
RELIGION	*Christian*	Medium	Medium	Medium	Medium	Low	Medium
	Muslim	Low	Medium	Medium	Medium	Low	Low
EDUCATION LEVEL	*SSSI*	Low	Medium	Medium	Medium	Low	Low
	SSSII	Low	Medium	Low	Medium	Low	Low
	SSSIII	Low	Medium	Medium	Medium	Low	Low
	Tertiary Inst.	Medium	High	Medium	Medium	Medium	Medium
RESPONDENTS' DIVISION	*Badagry*	Low	Medium	Low	Medium	Low	Low
	Epe	Low	Low	Medium	Medium	Low	Low
	Ikeja	Medium	Medium	Medium	Medium	Medium	Medium
	Ikorodu	Medium	Medium	Low	Medium	Low	Low
	Lagos Island	Medium	Medium	Medium	Medium	Low	Medium

Appendix V

Research Framework for Validation


Proposed KM based Framework for HIV activities in Lagos State Schools (detail view)
- - - - proposed activity
Awareness STIs/Condom Usage
Monitoring HIV incidence
Monitoring HIV Prevalence Rate
Monitoring HIV incidence
Monitoring STIs Epidemic disease(s) Out-break
HIV Transmission awareness
Campaign against HIV Stigmatisation
Condom Usage
STIs Awareness and Clinical Remedy
HIV Counselling Awareness
HIV-test/Awareness
HIV Transmission Counselling
HCT Facilities Centres
KM
Hospitals (Privates/Publics) and Healthcare Centres
Healthcare Information system
Telecommunication
Information Technology
Information management
Database
Condom Usage
Mobile Learning HIV BCC/IEC
Telecare/Telemedicine
Mobile Pharmacy
NGOs (T & P)
LSACA (M & E)
STIs Awareness and Clinical Remedy
GSM Operator(s) / Mobile Phone Application(s)
HIV Prevention and Behavioural Change Group
STIs Care, Treatments and Support Group
Risk Factor(s) (M & E) / Research and surveillance Group
Lagos State students (risk group)
Quality Indicator(s) / Data analysis
Quality Indicator(s)
Monitoring State of HIV in Lagos State
Capacity Strengthening

Appendix VI

Framework Validation

(i) Validation Pack

(ii) Responses pages: Case A – H

Evaluating knowledge-based HIV/AIDS education initiatives in Lagos

Waliu Olalekan, APENA

Biomedical Computing & Engineering Applied Research Group (BIOCORE),
Coventry University, UK

February 2012

Research Framework

(submitted for validation)

Lagos State HIV/AIDS Non-Governmental Organisations (NGOs) and HCT Facilities Centres

Collaborator
Lagos State AIDS Control Agency (LSACA), Lagos, Nigeria

Introduction

I am a PhD research student with the *Biomedical Computing and Engineering Technologies (BIOCORE) Applied Research Group* at Coventry University (UK). This work is in collaboration with Lagos State AIDS Control Agency (LSACA) and fulfilment of the requirements for the award of Doctor of Philosophy (PhD).

The aim of this research is to evaluate the extent of HIV/AIDS awareness and education in Lagos State and, by doing so, develop a framework for the introduction of Knowledge Management **(KM)** into HIV/AIDS activities in Lagos State of Nigeria.

Any information and contributions provided for this framework validation will be treated as confidential and used for research purposes only.

Thank you in advance for your assistance.

Waliu Olalekan, Apena

apenaw@uni.coventry.ac.uk

Documents

- **Summary of Original Empirical Research (Apena *et. al*, 2010/11).**

  The summary of original empirical research revealed the extent of HIV awareness in Lagos State Schools. The survey (958 respondents) was carried out in Five (5) administrative divisions (Badagry, Epe, Ikeja, Ikorodu and Lagos Island) of Lagos State Senior Secondary Schools and Lagos State University in accordance with Lagos State Ministry of Education ethical policy.

- **Proposed KM based Framework for HIV Activities in Lagos State Schools (detail).**

  KM based framework is developed towards the empirical research to address the state of HIV awareness in Lagos State Secondary Schools, in doing so other risk groups and factors are taken into consideration.

- **Response form**

  The attached response form is for the NGOs and HCT facilities centres to provide comments and insights on the framework as it currently stands.

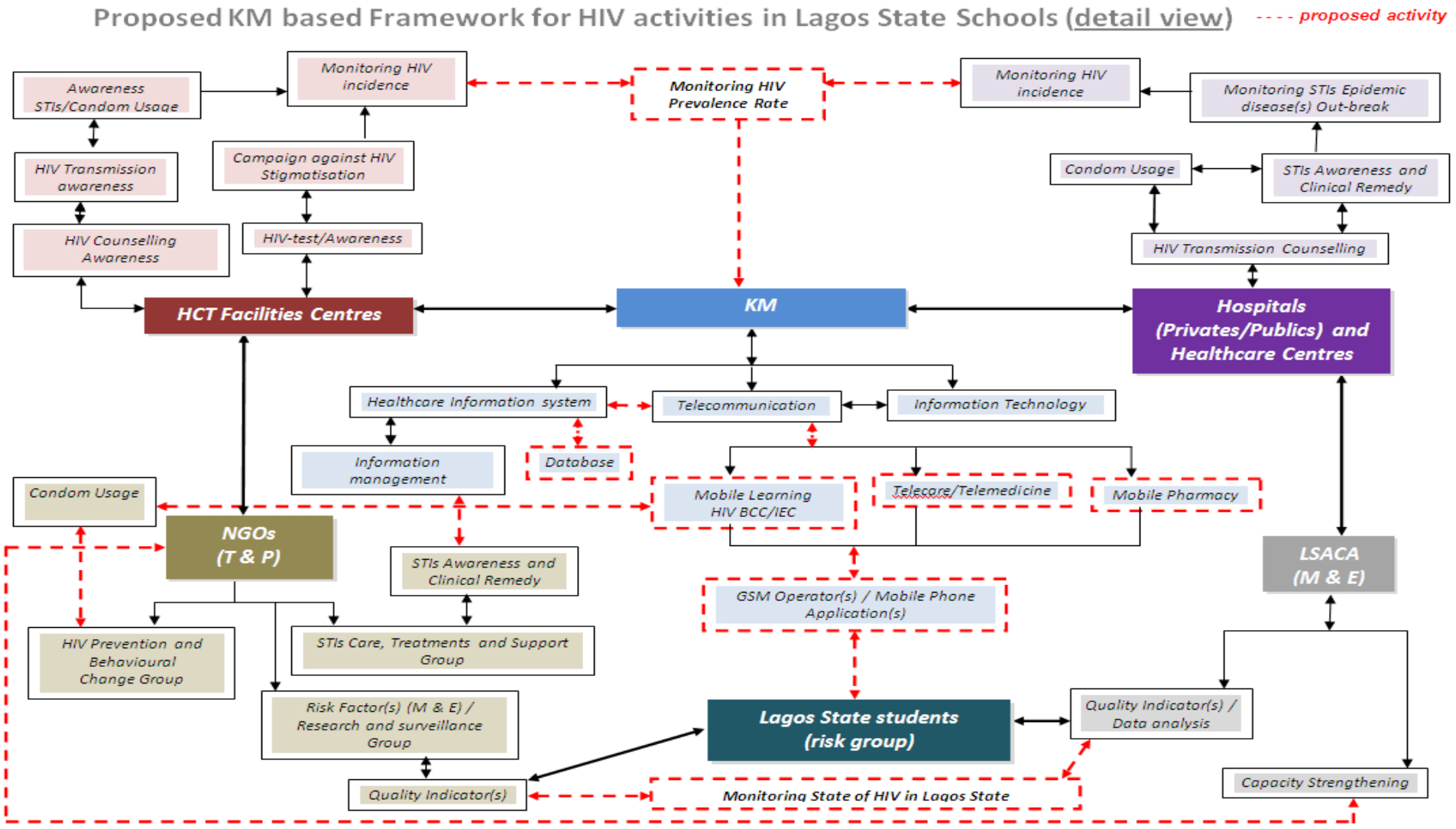
Respondents' Demography		*HIV Transmission Understanding*	*STIs Clinical Remedy Awareness*	*Use of Condom*	*Awareness on Stigmatisation*	*HIV-test Awareness*	*HCT centres Awareness (in their areas)*
GENDER	*Male*	Low	Medium	Medium	Medium	Low	Low
	Female	Medium	Medium	Low*	Medium	Low	Low
AGE GROUP	*15-16*	Low	Medium	Low	Medium	Low	Low
	17-18	Low	Medium	Medium	Medium	Low	Low
	19-20	Low	Medium	Medium	Medium	Low	Low
	21-22	Medium	Medium	Medium	Medium	Medium	Medium
	23-24	Medium	High	Medium	Medium	Medium	Medium
	25 and above	Medium	High	Medium	Medium	Medium	Medium
MARITAL STATUS	*Single*	Medium	Medium	Medium	Medium	Low	Low
	Married	Medium	High	I / U	Medium	Medium	Medium
RELIGION	*Christian*	Medium	Medium	Medium	Medium	Low	Medium
	Muslim	Low	Medium	Medium	Medium	Low	Low
EDUCATION LEVEL	*SSSI*	Low	Medium	Medium	Medium	Low	Low
	SSSII	Low	Medium	Low	Medium	Low	Low
	SSSIII	Low	Medium	Medium	Medium	Low	Low
	Tertiary Inst.	Medium	High	Medium	Medium	Medium	Medium
RESPONDENTS' DIVISION	*Badagry*	Low	Medium	Low	Medium	Low	Low
	Epe	Low	Low	Medium	Medium	Low	Low
	Ikeja	Medium	Medium	Medium	Medium	Medium	Medium
	Ikorodu	Medium	Medium	Low	Medium	Low	Low
	Lagos Island	Medium	Medium	Medium	Medium	Low	Medium

Proposed KM based Framework for HIV activities in Lagos State Schools (detail view)

The next page shows the detailed diagram of the proposed framework

Notes:

KM:	Knowledge Management
NGO:	Non-Governmental Organisation
IEC:	Information, Education and Communication
BCC:	Behavioural Change Communication
LSACA:	Lagos State AIDS Control Agency
STIs:	Sexual Transmitted Infection(s)
GSM:	Global System for Mobile
M&E:	Monitoring and Evaluation
T&P:	Transmission and Prevention
HCT:	HIV Counselling and Testing
– – –	Proposed activity


Proposed KM based Framework for HIV activities in Lagos State Schools (detail view)
- - - - proposed activity
Awareness STIs/Condom Usage
Monitoring HIV incidence
Monitoring HIV Prevalence Rate
Monitoring HIV incidence
Monitoring STIs Epidemic disease(s) Out-break
HIV Transmission awareness
Campaign against HIV Stigmatisation
Condom Usage
STIs Awareness and Clinical Remedy
HIV Counselling Awareness
HIV-test/Awareness
HIV Transmission Counselling
HCT Facilities Centres
KM
Hospitals (Privates/Publics) and Healthcare Centres
Healthcare Information system
Telecommunication
Information Technology
Information management
Database
Condom Usage
Mobile Learning HIV BCC/IEC
Telecare/Telemedicine
Mobile Pharmacy
NGOs (T & P)
LSACA (M & E)
STIs Awareness and Clinical Remedy
GSM Operator(s) / Mobile Phone Application(s)
HIV Prevention and Behavioural Change Group
STIs Care, Treatments and Support Group
Risk Factor(s) (M & E) / Research and surveillance Group
Lagos State students (risk group)
Quality Indicator(s) / Data analysis
Quality Indicator(s)
Monitoring State of HIV in Lagos State
Capacity Strengthening

Response Form

---

1 What is your view regarding the application of Knowledge Management (KM) (healthcare information system, telecommunication and information technology) to synchronize HIV/AIDS activities (non clinical) in Lagos State as shown on the proposed framework?

---

2 What is your view regarding the adoption of information-based techniques (mobile learning techniques, telecare/telemedicine and mobile pharmacy) and Mobile Phone applications (SMS text and call) to address HIV/AIDS behavioural issues and overall awareness as shown on the proposed framework?

---

3 Do you think the proposed KM based framework shown will be accessible, reliable and sustainable for HIV activities in Lagos State? If not, please comment (feel free to indicate on the detailed framework diagram)

---

4 Please provide your views on addressing HIV transmission awareness/understanding via Lagos State students (risk group) GSM-Mobile phone applications (SMS text and calls) through electronic mobile learning technique.

---

5 Do you think STIs clinical remedy awareness can be strengthened through mobile phones, using telecare/telemedicine and mobile pharmacy initiatives in Lagos State Schools (as shown on the proposed framework)?

---

6 Please provide your views on whether the proposed framework could be used to address HIV behavioural change communication (BCC) and information, education and communication (IEC) on use of Condom and fear of stigmatisation among Lagos State students.

---

7 Do you think the proposed framework will enhance HIV-test and HIV counselling awareness to a greater level via Lagos State students' mobile phone technologies?

---

8 Do you have any further comments on the proposed framework?

Thank you for your time.

Validation Responses Pages:

Cases A – H

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Applied Research Group

Response Form

CASE – A1

1 What is your view regarding the application of Knowledge Management (KM) (healthcare information system, telecommunication and information technology) to synchronize HIV/AIDS activities (non clinical) in Lagos State as shown on the proposed framework?

Any information will certainly be helped by the use of electronic information disseminating devices that abound in usage every day of our modern live.

2 What is your view regarding the adoption of information-based techniques (mobile learning techniques, telecare/telemedicine and mobile pharmacy) and Mobile Phone applications (SMS text and call) to address HIV/AIDS behavioural issues and overall awareness as shown on the proposed framework?

To put it succinctly, I'll say it is the world, we live in and nothing can actually be achieved to the highest satisfactory level without employing the use of all these modern day information-based techniques that are earlier on enumerated above.

3 Do you think the proposed KM based framework shown will be accessible, reliable and sustainable for HIV activities in Lagos State? If not, please comment (feel free to indicate on the detailed framework diagram)

Yes, the proposed KM based framework is certainly achievable and will be accessible as well as sustainable. Lagos challenges is electricity. This is being surmounted by individual generating and having alternative source of power apart from National grid Power supply.

4 Please provide your views on addressing HIV transmission awareness/understanding via Lagos State students (risk group) GSM-Mobile phone applications (SMS text and calls) through electronic mobile learning technique.

I am yet to find any student without in Lagos and elsewhere in the country without at least one MOBILE Phone and some other mobile devices such as i-pad, tablets, etc. Therefore, all necessary and update information are at their finger tips through Clicking of a buttons or pinging.

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BIOCORE
Applied Research Group

A11

5 Do you think STIs clinical remedy awareness can be strengthened through mobile phones, using telecare/telemedicine and mobile pharmacy initiatives in Lagos State Schools (as shown on the proposed framework)?

I have no doubt that employment of mobile phones and other mobile information disseminating devices will surely strengthen the awareness of STIs clinical remedy

6 Please provide your views on whether the proposed framework could be used to address HIV behavioural change communication (BCC) and information, education and communication (IEC) on use of Condom and fear of stigmatisation among Lagos State students.

The proposed framework can certainly be used for HIV BCC on the following grounds:- (A) All most all students have at least one mobile phone (B) If it is not going to incure any additional cost in usage of the device (C) If electricity is available to keeps their device in working condition (D) If the information sent are short and in eye catchy phrase.

7 Do you think the proposed framework will enhance HIV-test and HIV counselling awareness to a greater level via Lagos State students' mobile phone technologies?

Yes, the proposed framework will surely enhance HIV test and counselling awareness to an even unimaginable level, simply because most student, eat, drink, breath and sleep in the realm of this technology. They can not, for once contemplate living a useful life without this modern day technologies.

8 Do you have any further comments on the proposed framework?

The information should be ~~sent~~ framed and sent in socially acceptable language and during socially acceptable hours to the student

Jumoke Owoola
Nigeria Network of NGO's

Thank you for your time.

[redacted]

Non-Governmental

28/03/2012

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Applied Research Group

Response Form

CASE B.

1 What is your view regarding the application of Knowledge Management (KM) (healthcare information system, telecommunication and information technology) to synchronize HIV/AIDS activities (non clinical) in Lagos State as shown on the proposed framework?

Fantastic Idea but only when properly managed

2 What is your view regarding the adoption of information-based techniques (mobile learning techniques, telecare/telemedicine and mobile pharmacy) and Mobile Phone applications (SMS text and call) to address HIV/AIDS behavioural issues and overall awareness as shown on the proposed framework?

The Issue of Mobile pharmacy is a good one but that of Sms text call can only benefit the enlightened ones in our Society as majority do not know anything about text rather they just make ~~make~~ ~~Call~~ and answer calls.

3 Do you think the proposed KM based framework shown will be accessible, reliable and sustainable for HIV activities in Lagos State? If not, please comment (feel free to indicate on the detailed framework diagram)

It will be reliable with time if this is total Commitment from persons Involved in the project

4 Please provide your views on addressing HIV transmission awareness/understanding via Lagos State students (risk group) GSM-Mobile phone applications (SMS text and calls) through electronic mobile learning technique.

Awareness shall be Created through Seminar/work shops, before Kick starting the sms for a better Understanding amongst the populace.

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B11

5 Do you think STIs clinical remedy awareness can be strengthened through mobile phones, using telecare/telemedicine and mobile pharmacy initiatives in Lagos State Schools (as shown on the proposed framework)?

It can be Strenghened if only Schools run by different religions Bodies are duly Consulted a local languages Considered for its effectsweness.

6 Please provide your views on whether the proposed framework could be used to address HIV behavioural change communication (BCC) and information, education and communication (IEC) on use of Condom and fear of stigmatisation among Lagos State students.

To truely address the Issues raised will recommend the Shotting of Home Video (Drama) both in Englis and Yoruba language to reach out to everyone, as Lagos is a mini Nigeria. Dont forget that Nigerian Lovers.

7 Do you think the proposed framework will enhance HIV-test and HIV counselling awareness to a greater level via Lagos State students' mobile phone technologies?

Nigerians believe in what they see, they need t be fully Convinced pratically the SMS is just a ste not the ultimate

8 Do you have any further comments on the proposed framework?

Creating more effective awavness for the total annihilati of the disease.
The heart of Childrenhie from basic 4-6 (JSS1-3) wi be easyly won through a Simple drama if you give me opportunity to do it I called it CACTH THEM YOUG duration is (LAUGH THAT MAICE SENSE) LIFE HAS NO DUPLICATE) Love to watch movies.
Nigerian/childred Be.
DAVID OLUSEGUN - DIVINE WILL FILM PRODUCTION.

Thank you for your time.

[redacted]

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Applied Research Group

Response Form

CASE C1

---

1 What is your view regarding the application of Knowledge Management (KM) (healthcare information system, telecommunication and information technology) to synchronize HIV/AIDS activities (non clinical) in Lagos State as shown on the proposed framework?

It looks like it will really help as it seems to form the core of a whole lot of HIV/AIDS activities.

---

2 What is your view regarding the adoption of information-based techniques (mobile learning techniques, telecare/telemedicine and mobile pharmacy) and Mobile Phone applications (SMS text and call) to address HIV/AIDS behavioural issues and overall awareness as shown on the proposed framework?

Modern day information based techniques are now used for a good number of things, so it will be useful in this regard too

---

3 Do you think the proposed KM based framework shown will be accessible, reliable and sustainable for HIV activities in Lagos State? If not, please comment (feel free to indicate on the detailed framework diagram)

If it is pursued at the state level with enough passion, it will be sustainable.

---

4 Please provide your views on addressing HIV transmission awareness/understanding via Lagos State students (risk group) GSM-Mobile phone applications (SMS text and calls) through electronic mobile learning technique.

Most students use mobile phones, so passing educative information on HIV/AIDS to them through their phone will be very helpful.

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C11

5 Do you think STIs clinical remedy awareness can be strengthened through mobile phones, using telecare/telemedicine and mobile pharmacy initiatives in Lagos State Schools (as shown on the proposed framework)?

Yes

6 Please provide your views on whether the proposed framework could be used to address HIV behavioural change communication (BCC) and information, education and communication (IEC) on use of Condom and fear of stigmatisation among Lagos State students.

The frame work is good to bring about a greeat behaviour change.

7 Do you think the proposed framework will enhance HIV-test and HIV counselling awareness to a greater level via Lagos State students' mobile phone technologies?

Yes it will

8 Do you have any further comments on the proposed framework?

Its implimentation will bring about a lot of positive changes on HIV/AIDS issues but will need very viable hands to oversee implimentation

Thank you for your time.

GENERAL HOSPITAL
IEAKO IAIYE
[redacted]

Coventry University

Biomedical Computing and Engineering Technologies
BIOCORE
Applied Research Group

Response Form

CASE D1

---

1 What is your view regarding the application of Knowledge Management (KM) (healthcare information system, telecommunication and information technology) to synchronize HIV/AIDS activities (non clinical) in Lagos State as shown on the proposed framework?

It is very good to dessiminate information

---

2 What is your view regarding the adoption of information-based techniques (mobile learning techniques, telecare/telemedicine and mobile pharmacy) and Mobile Phone applications (SMS text and call) to address HIV/AIDS behavioural issues and overall awareness as shown on the proposed framework?

It is quite good and applicable

---

3 Do you think the proposed KM based framework shown will be accessible, reliable and sustainable for HIV activities in Lagos State? If not, please comment (feel free to indicate on the detailed framework diagram)

It depends on the way it is introduced. The way you handle different age groups will determine its efficacy.

---

4 Please provide your views on addressing HIV transmission awareness/understanding via Lagos State students (risk group) GSM-Mobile phone applications (SMS text and calls) through electronic mobile learning technique.

He must bring the information to the bearer minimum of a page converted to a paragraph and so on.

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Applied Research Group

D11

---

5 Do you think STIs clinical remedy awareness can be strengthened through mobile phones, using telecare/telemedicine and mobile pharmacy initiatives in Lagos State Schools (as shown on the proposed framework)?

Yes

---

6 Please provide your views on whether the proposed framework could be used to address HIV behavioural change communication (BCC) and information, education and communication (IEC) on use of Condom and fear of stigmatisation among Lagos State students.

Its presentation will determine its success level.

---

7 Do you think the proposed framework will enhance HIV-test and HIV counselling awareness to a greater level via Lagos State students' mobile phone technologies?

If they are frequently informed, it will work.

---

8 Do you have any further comments on the proposed framework?

If frequently used, it will be absorbed into the subconscious and eventually achieved desired objective.

CONCERN FOR NEW NATION

Thank you for your time.

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Applied Research Group

Response Form

CASE E1

---

1 What is your view regarding the application of Knowledge Management (KM) (healthcare information system, telecommunication and information technology) to synchronize HIV/AIDS activities (non clinical) in Lagos State as shown on the proposed framework?

It is good if handled in a proper way.

---

2 What is your view regarding the adoption of information-based techniques (mobile learning techniques, telecare/telemedicine and mobile pharmacy) and Mobile Phone applications (SMS text and call) to address HIV/AIDS behavioural issues and overall awareness as shown on the proposed framework?

Good but should be presented in a wa
and manners people will value the
application and its contents.

---

3 Do you think the proposed KM based framework shown will be accessible, reliable and sustainable for HIV activities in Lagos State? If not, please comment (feel free to indicate on the detailed framework diagram)

It will be reliable though it might
take some time

---

4 Please provide your views on addressing HIV transmission awareness/understanding via Lagos State students (risk group) GSM-Mobile phone applications (SMS text and calls) through electronic mobile learning technique.

Firstly, there is need ~~for~~ awareness in the
way people will understand the impact, the
the km/SMS can start.
Secondly, make it entertaining/user friendly.

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Applied Research Group

E11

5 Do you think STIs clinical remedy awareness can be strengthened through mobile phones, using telecare/telemedicine and mobile pharmacy initiatives in Lagos State Schools (as shown on the proposed framework)?

Emphasise on proper awareness mostly in the local languages, once you do this, you can achieve your aim.

6 Please provide your views on whether the proposed framework could be used to address HIV behavioural change communication (BCC) and information, education and communication (IEC) on use of Condom and fear of stigmatisation among Lagos State students.

It depends on whom you are targeting because Nigeria has many religions and different peoples tribes. Do you talk of Condom to a 60 year old woman? Or an artisan with no knowledge.

7 Do you think the proposed framework will enhance HIV-test and HIV counselling awareness to a greater level via Lagos State students' mobile phone technologies?

NO. Even when you talk face to face on this issue, people are still skeptical, how much more "mere" SMS

8 Do you have any further comments on the proposed framework?

It is good but think of people, culture, attitude etc and find the best way to reach each group.

Thank you for your time.

AID FOR AIDS SOCIETY
A member of NNNGOs (Nigeria)
[redacted]
26/08/2012 | 11.22 am |.

Coventry University

Biomedical Computing and Engineering Technologies
BIOCORE
Applied Research Group

Response Form

CASE F1

---

1 What is your view regarding the application of Knowledge Management (KM) (healthcare information system, telecommunication and information technology) to synchronize HIV/AIDS activities (non clinical) in Lagos State as shown on the proposed framework?

The model and organogram is good because it depicts necessary stakeholder in the success of the proposed KM.

---

2 What is your view regarding the adoption of information-based techniques (mobile learning techniques, telecare/telemedicine and mobile pharmacy) and Mobile Phone applications (SMS text and call) to address HIV/AIDS behavioural issues and overall awareness as shown on the proposed framework?

It's a novel idea essential in this modern days of information and technology revolution in order to derive a near perfect solution

---

3 Do you think the proposed KM based framework shown will be accessible, reliable and sustainable for HIV activities in Lagos State? If not, please comment (feel free to indicate on the detailed framework diagram)

Yes though a few modification will increase its productivity and efficiency.

---

4 Please provide your views on addressing HIV transmission awareness/understanding via Lagos State students (risk group) GSM-Mobile phone applications (SMS text and calls) through electronic mobile learning technique.

It is a great things, since all present student possess this electronic gadget in various forms.

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BIOCORE
Applied Research Group

F11

---

5 Do you think STIs clinical remedy awareness can be strengthened through mobile phones, using telecare/telemedicine and mobile pharmacy initiatives in Lagos State Schools (as shown on the proposed framework)?

Yes, since such services require personal contact, confidentiality and prompt correspondence btw parties.

---

6 Please provide your views on whether the proposed framework could be used to address HIV behavioural change communication (BCC) and information, education and communication (IEC) on use of Condom and fear of stigmatisation among Lagos State students.

It will help to increase the awareness since the channel appeal to all in various quarters.

---

7 Do you think the proposed framework will enhance HIV-test and HIV counselling awareness to a greater level via Lagos State students' mobile phone technologies?

Yes, because hiv-test & Counselling progress when the awareness is high and the personality is secured.

---

8 Do you have any further comments on the proposed framework?

Yes, the framework appear complex while most of the activities are integral part of the whole. for example a database is an essential part of a valid MIS while all the Telemedicine mobile Learning & mobile pharmacy are interrelated.

Thank you for your time.

Coventry University

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BIOCORE
Applied Research Group

Response Form

CASE G1

1 What is your view regarding the application of Knowledge Management (KM) (healthcare information system, telecommunication and information technology) to synchronize HIV/AIDS activities (non clinical) in Lagos State as shown on the proposed framework?

The model proposed in the knowledge management (KM) framework, has a detailed activity on how to reach out to schools in Lagos state, because tele-communication is the highest medium of communication now

2 What is your view regarding the adoption of information-based techniques (mobile learning techniques, telecare/telemedicine and mobile pharmacy) and Mobile Phone applications (SMS text and call) to address HIV/AIDS behavioural issues and overall awareness as shown on the proposed framework? Information is power, and in view of the what these are taken to the door steps of people that need it, it becomes very vital: via mobile phone and other out door activities, I believe that the users of the information will appreciate it more.

3 Do you think the proposed KM based framework shown will be accessible, reliable and sustainable for HIV activities in Lagos State? If not, please comment (feel free to indicate on the detailed framework diagram) If the activity is done on out door basis, some people might feel reluctant to go into the shop/mobile pharmacy outlet to get information because of the stigma associated with HIV in Nigeria, Lagos state is not unexceptio

4 Please provide your views on addressing HIV transmission awareness/understanding via Lagos State students (risk group) GSM-Mobile phone applications (SMS text and calls) through electronic mobile learning technique. It a welcome development, in that so many students are carrying this virus without be aware of the virus in their system or its symtops. If the GMS or SMS technique is people can freely call or text without there identi known and get information on what to do.

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G11

5 Do you think STIs clinical remedy awareness can be strengthened through mobile phones, using telecare/telemedicine and mobile pharmacy initiatives in Lagos State Schools (as shown on the proposed framework)? It could help if detailed informat- are passed through SMS on mobile phones, so that the students will understand the programme before they have an encounter with it.

6 Please provide your views on whether the proposed framework could be used to address HIV behavioural change communication (BCC) and information, education and communication (IEC) on use of Condom and fear of stigmatisation among Lagos State students. It could help if use in the right channel; that is right information to the right people that need it at every particular time. So that it will not form like a disturbance to person who do not need the information via SMS.

7 Do you think the proposed framework will enhance HIV-test and HIV counselling awareness to a greater level via Lagos State students' mobile phone technologies? I am of the view that, if the proposed framework is carried out well, people will be aware of the HIV and will run to run a test for that, because every where you go it will be what will be the talk of the da

8 Do you have any further comments on the proposed framework?
The model needs to be monitored at all stages, So that the programme will not be infiltrated. And also that the aim at which the work is carried out will not be defeated. It needs prop control, planning and monitoring at every stag

Thank you for your time.

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Response Form

CASE H1

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1 What is your view regarding the application of Knowledge Management (KM) (healthcare information system, telecommunication and information technology) to synchronize HIV/AIDS activities (non clinical) in Lagos State as shown on the proposed framework?

A Sound synchronization model which captures the target audience irrespective of location.

---

2 What is your view regarding the adoption of information-based techniques (mobile learning techniques, telecare/telemedicine and mobile pharmacy) and Mobile Phone applications (SMS text and call) to address HIV/AIDS behavioural issues and overall awareness as shown on the proposed framework?

Interesting, taking cognisance of the wide spread useage of mobile telecommunication in this part of the world. Though sensitization on the mode of information transmission need adequate attention using other media

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3 Do you think the proposed KM based framework shown will be accessible, reliable and sustainable for HIV activities in Lagos State? If not, please comment (feel free to indicate on the detailed framework diagram)

- To a logical extent, the framework is possible. But emphasis need to be laid to awareness using other medium on the proposed framework.

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4 Please provide your views on addressing HIV transmission awareness/understanding via Lagos State students (risk group) GSM-Mobile phone applications (SMS text and calls) through electronic mobile learning technique.

I think the model is a right thought channeled using the most pronounced form of communication. Although, cost implication might be a major impediment as average student do not have access to this device (GSM)

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H11

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5 Do you think STIs clinical remedy awareness can be strengthened through mobile phones, using telecare/telemedicine and mobile pharmacy initiatives in Lagos State Schools (as shown on the proposed framework)?

Yes I do

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6 Please provide your views on whether the proposed framework could be used to address HIV behavioural change communication (BCC) and information, education and communication (IEC) on use of Condom and fear of stigmatisation among Lagos State students.

Yes it will assist in intensifying ~~and improving~~ prior effort in HIV behavioural change Communications and information.

---

7 Do you think the proposed framework will enhance HIV-test and HIV counselling awareness to a greater level via Lagos State students' mobile phone technologies?

It will, if other medium are annexed into the model.

---

8 Do you have any further comments on the proposed framework?

A pre test should be carried out on the viability of the model and possible amendment made before the survey proper.

Thank you for your time.

Appendix VII

Proposed KM based Framework for HIV activities in Lagos State Schools (detail view).


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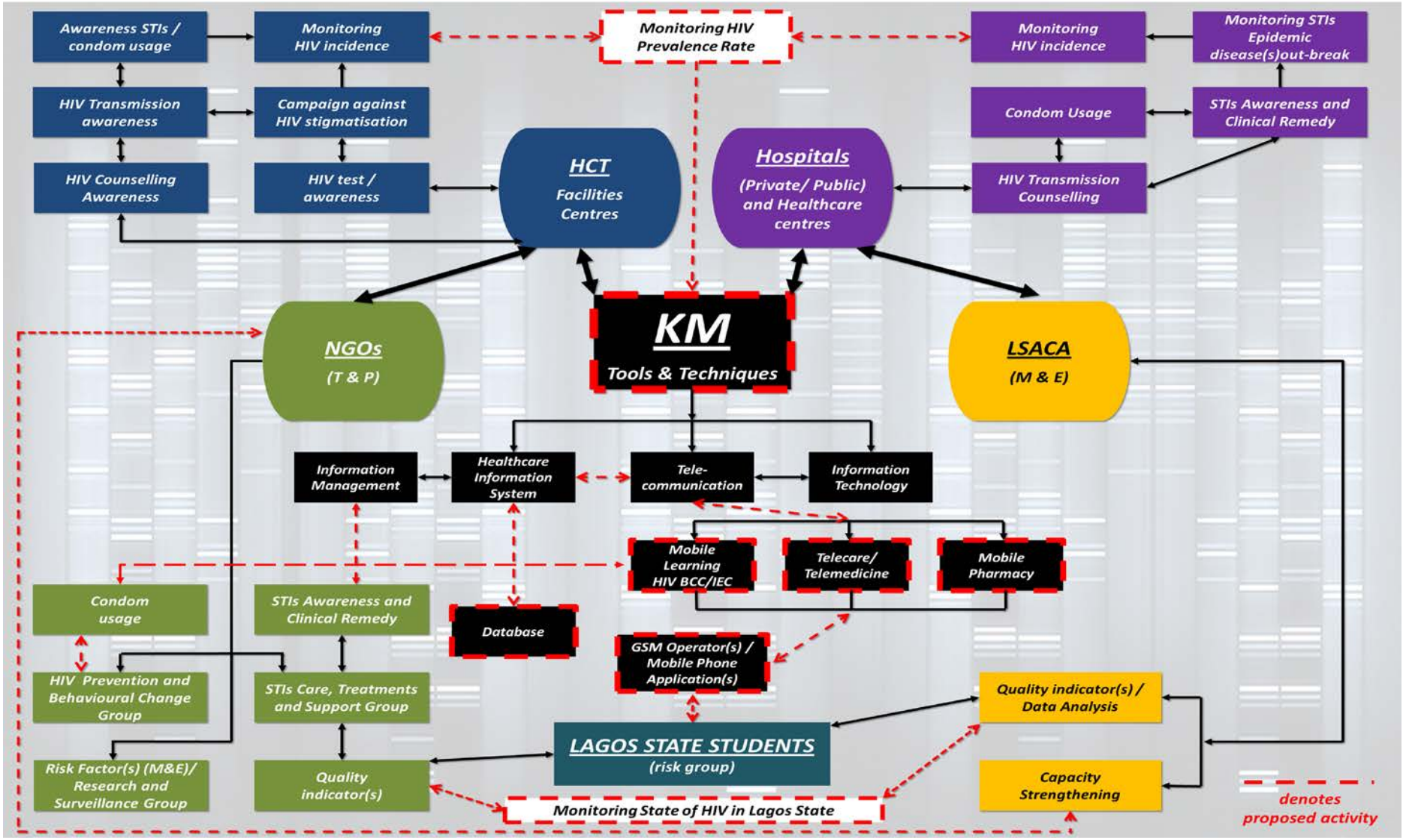
Proposed KM based Framework for HIV activities in Lagos State Schools (detail view).



Appendix VIII

Collaborators Letter

(i) Lagos State Ministry of Education

(ii) Lagos State AIDS Control Agency – LSACA

LAGOS STATE AIDS CONTROL AGENCY

Governor's Office

Secretariat:
General Hospital Lagos.
Opposite - Western House
Broad Street,
Lagos - Island.
Tel: 01-7387995

WORLD AIDS CAMPAIGN

27th October 2010

Dr. Rajeev K. Bali

Biomedical Computing & Engineering Technologies

Applied Research Group

Coventry University

Coventry U.K

Dear Dr. Bali

RE: WALIU OLALEKAN APENA – Research Collaboration

This is to acknowledge receipt of your letter on the above subject matter.

We are pleased to offer our assistance and support regarding provision of information and access to data concerning HIV and AIDS in Lagos State as required by Mr. Waliu Apena.

We look forward to meeting with him.

Yours Sincerely

[redacted]

Dr. Olusegun Ogboye

Head, Projects

MISSION STATEMENT:
To reduce incidence of HIV/AIDS in Lagos State and to mitigate its effects on those infected and affected

LAGOS STATE GOVERNMENT
MINISTRY OF EDUCATION

The Secretariat,
Block No.:5
Alausa-Ikeja.
PMB No.:2104311
Ikeja

E-mail: edunet.lagosstate.gov.ng
Website: www.lagosstate.gov.ng

Ref. No: BES/CGSC/ADM/29/S.I.III/347

Date: 22nd September, 2010.

Mr. Wasiu Olalekan Apena
[redacted]

RE:- REQUEST FOR COLLABORATION

LETTER OF APPROVAL

Your letter to the Ministry on the above subject refers please.

2. I am directed to convey approval of the Ministry to you as requested.

3. You are however requested to identify yourself at the Ministry of Education before embarking on your research work in the State's Schools.

4. You are also requested to liaise with the Guidance Counsellors in the Education Districts for necessary assistance.

5. Thank you.

[redacted]

A.O.Olaogun (Mrs.)
For: Permanent Secretary